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ABSTRACT

This report of the proceedings of a conference on institutional research techniques contains information on the conference and 23 selected papers. Conference information includes the program, a list of steering committee members, and a list of attenders. The following papers are included: (1) "Examples of How Institutional Research Can Help Campus Administrators with Their Survey Research Needs" (Karen W. Bauer); (2) "No Pain, No Gain: How One College Emerged Stronger from the Fiscal Crisis" (Craig A. Clagett); (3) "Outreach Programs and Their Varying Impact on Key Market Segments" (David J. Costello); (4) "Analytical Techniques for Studying Student Retention" (Anne Marie Delaney); (5) "Designing Alumni Research for Assessment and Planning" (Anne Marie Delaney); (6) "Beyond E-mail: Getting Data from the Internet" (Jim Fergerson); (7) "To Have and To Hold: On the Meaning of 'Retention'" (Thomas B. Flaherty and Jennifer A. Brown); (8) "Making the Most of the Mission Review: A Topical Case Study" (Eleanor Fujita and Mark Oromaner); (9) "A Review of Reliability, Validity and Useability Considerations in the Use of the Writing Sample as an Index of Program Effect" (Stanley S. Jacobs, Mary Ann Ausetts); (10) "Developing Consistency Data for the ASQ Plus" (Ellen Armstrong Kanarek); (11) "Using the Admitted Student Questionnaire to Determine Cognitive Fit between Incoming Students and College and Predicting the Future Enrollment Behavior" (Yun K. Kim); (12) "Faculty Salary Equity--Comparison of Two Methodologies" (Denise A. Krallman); (13) "Salary Compression Analysis" (Denise A. Krallman); (14) "A Demographic and Economic Outlook for the 1990's" (Marcia M. Lee); (15) "An Analysis of Entering Freshman Survey Data as It Relates to Graduation Rates" (Linda M. LeFauve, Mark L. Molnar); (16) "Electronic Survey Data on Gopher" (Cynthia B. Lucia); (17) "How Insensitive Can You Get? Further Analysis of the 'Best Colleges' Rankings" (Michael D. McGuire); (18) "A Critical Multiplist Evaluation of Developmental Reading Instruction at Suffolk Community College" (Anthony Napoli, Paul Wortman, and Christina Norman); (19) "Inferential Research Methods in Educational Administration: Benefits and Limitations" (Caroline L. Pike, Sharon L. Todd); (20) "Organizational Influences on Disparities between Male and Female Faculty Salaries" (Catherine E. Regan, J. Fredericks Volkwein); (21) "Influence of Background Variables on Students' Evaluation of Faculty" (Stuart L. Rich); (22) "An Analysis of Patterns of Federal Support for Academic Science and Engineering: 1981-1991" (James F. Trainer); and (23) "The Relationship of Campus Crime to Campus and Community Characteristics" (J. Fredericks Volkwein, Bruce Szelest, Alan J. Lizotte). (JB)

ED 366 244

North East Association for Institutional Research

20th Annual Conference

Proceedings

20 Years: Putting it All Together

BEST COPY AVAILABLE

The Sagamore at Lake George • Bolton Landing, N.Y. • November 6-9, 1993

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20 Years: Putting it All Together

President's Message

The 20th Annual Conference of the North East Association for Institutional Research, held November 6-9, 1993 at The Sagamore on Lake George in Bolton Landing, NY, was a tremendous success. This conference will undoubtedly be remembered by those who attended for its idyllic location and innovative program.

This year's conference theme, "20 Years: Putting it All Together", was very appropriate and illustrative of our profession. What a long way our association has come in the twenty years since the inaugural conference was held in Williamstown, MA. The inaugural conference featured a keynote address, given by Lois Torrence, and three paper presentations. I think that it is quite fitting that at our 20th annual conference, the NEAIR membership voted to confer emeritus membership status upon Lois. Twenty years later our annual conference featured numerous workshops, paper presentations, panel discussions, special interest group meetings, and the inaugural team case study.

Special thanks and credit are due to Marge Wiseman, Program Chair, and to Diane Cuneo, Local Arrangements Chair, for their excellent organization and planning. They set out to provide a conference that would take full advantage of the unique setting, to provide a rich learning environment and to foster collegial networking opportunities. The Sunday night keynote address by Robert Culver, Senior Vice President and Treasurer at Northeastern University, provided us with valuable insights and practical approaches to cost reductions and productivity enhancements. The team case study that was woven throughout the traditional parts of the program provided participants the opportunity to share and practice institutional research techniques. Many thanks go to Marian Pagano who conceived of and orchestrated this new conference component. The Monday evening dinner and Karaoke event was definitely an opportunity to make new friends, to reestablish old acquaintances and generally let our hair down.

Congratulations to all the newly-elected NEAIR officers: to Marian Pagano on her election to the position of President-Elect, to Jane Price, on her election to Secretary, and to Darryl Bullock, Diane Cuneo, and Stuart Rich on their election to the Steering Committee. Additional thanks go to Jane Price who is serving double duty as Publications Chair and is responsible for the compilation and production of these Proceedings. The membership can be confident that these newly elected officers and steering committee members will serve the organization well. A special thank you to Larry Metzger and Tom Flaherty, who provided advice and guidance throughout my tenure as president. Heartfelt thanks go to Brenda Bretz, our membership secretary, for all her help and for the hours of service she provides this organization. Best wishes to Mike McGuire, a valued friend and colleague, as he assumes the responsibilities of the presidency. His new initiatives will strengthen and move NEAIR forward in the year ahead. With these acknowledgments, and heartfelt thanks to members of the Steering Committee and to the members of NEAIR, I commend to the membership these Proceedings. This has truly been a memorable year.

Dawn Geronimo Terkla
President, NEAIR 1992-93

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10:35 - 10:45	BREAK (Conference Center Lobby)			
10:45 - 12:15	TEAM CASE STUDY GROUPS (Conference Center - Bellvue)			
12:15 - 1:45	BUSINESS LUNCHEON (Conference Center Ballroom - Nirvana)			
2:00 - 2:45	Developing a Survey to Assess the Graduate School Experience	An Analysis of Entering Freshmen Survey Data As It Relates to Retention of Students	Making the Most of the Mission Review	Using ASQ to Determine Cognitive Fit Between Incoming Students and Future Enrollment
2:55 - 3:35	Putting the Real Focus Into Focus Groups	A Review of the Writing Sample as an Index of Program Effectiveness	Influence of Background Variables on Students' Evaluations of Faculty	Analysis of Funding Patterns for Federally Sponsored Rsch. in Sci. and Engin. 1981 - 1991
3:35 - 3:45	BREAK (Conference Center Lobby)			
3:50 - 4:30	Time to Degree Completion	Developing Reliability Data for the ASQ Plus (Rm.A) Trends in Campus Crime (Rm.B)	A Critical Multiplist Eval. of Dev. Reading Instruction at Suffolk Community College	~~Why Do Students Seek Employment~~
4:30 - 5:30	TEAM CASE STUDY GROUPS (Conference Center - Bellvue)			
6:00 - 7:00	RECEPTION, CASH BAR & HORS D'EOUVRES (Sagamore Dining Room)			
7:00 - 12:00	DINNER AND KARAOKE (Sagamore Dining Room)			
	TUESDAY - NOVEMBER 9			
6:30 - 7:30	FUN RUN/WALK (Meet at Main Hotel Entrance)			
7:30 - 8:30	U.S. News - America's Best Collge Values Discussion	BREAKFAST (Conference Center - Nirvana)		
8:00 - 9:00	Conference Evaluations (Invited Interviews) (Conference Center - Nirvana)			
9:00 - 9:45	(9:00 - 10:00) Student Right-to-Know and Graduation Rate Data	No Pain, No Gain: How One College Emerged Stronger From the Fiscal Crisis	Organizational Sources of Disparities Between Male and Female Faculty Salaries	Outreach Programs and Their Varying Impact on Key Market Segments
9:55 - 10:35		How Insensitive Can You Get? Further Anal. of the 'Best Colleges' Rankings	Analytical Techniques for Studying Student Retention	Topical Case Study on Salary Compression and Inversion
10:35 - 10:45	BREAK (Conference Center Lobby)			
10:45 - 12:00	TEAM CASE STUDY PRESENTATIONS (Conference Center - Bellvue)			
1:00 - 4:00	STEERING COMMITTEE MEETING (Evelley)			

Program at a Glance

Northeast Association for Institutional Research **20th Annual Conference** **The Sagamore, Lake George**

SATURDAY - NOVEMBER 6

Time	Evelley	Abenia A&B	Triuna A	Triuna B
12:00 - 5:00	REGISTRATION (Conference Room - Lobby)			
1:30 - 5:00	Newcomers Workshop	Total Quality Management Workshop (Session I)	Introduction to Statistics For Institutional Research	Understanding Campus Culture and Politics (Session I)
5:30 - 7:00	PRESIDENT'S RECEPTION (Sagamore Dining Room)			
SUNDAY - NOVEMBER 7				
8:00 - 5:00	Registration (Conference Center - Lobby)			
9:00 - 12:00	Effective Presentations For Institutional Research	Total Quality Management Workshop (Session II)	Intermediate Statistics For Institutional Research	
1:30 - 5:00	Workshop on Beyond E-Mail: Getting Around On the Internet	Workshop on Choosing Technology for the IR Office	Understanding Campus Culture and Politics (Session II)	(4:00 - 5:00) Catholic Colleges and Universities - SIG
5:00 - 5:30	MENTOR PROGRAM GET-TOGETHER (Triuna A)			
5:30 - 6:30	GENERAL SESSION - KEYNOTE SPEAKER (Conference Center - Bellvue)			
6:30 - 7:30	RECEPTION & CASH BAR (Sagamore Dining Room)			
7:30 - 9:30	BANQUET (Sagamore Dining Room)			
9:30 - 10:00	INITIAL TEAM HUDDLES (Sagamore Dining Room)			
MONDAY - NOVEMBER 8				
6:30 - 7:30	FUN RUN/WALK (Meet at Main Hotel Entrance)			
8:00 - 11:00	REGISTRATION (Conference Center - Lobby)			
7:30 - 8:30	BREAKFAST (Conference Center - Nirvana)			
7:45 - 8:45 SIGS	HEDS Consortium	Two- year Colleges (Rm.A) Pennsylvania State System (Rm.B)	ASQ - ASQ+ Interest Group	Public Universities Information Exchange
9:00 - 9:45	(9:00 - 10:00) The Use of NCES National Databases for Institutional Analysis	Designing Alumni Research for Assessment and Planning	Salary Equity: Comparison of Two Methodologies	Key Demographic and Economic Factors Affecting Community Colleges

Conference Program

Saturday	November 6
Newcomers to IR **Michael F. Middaugh** Director of IR & Planning University of Delaware **Karen Bauer** Senior Research Analyst University of Delaware **Dale Trusheim** Assoc. Director of IR & Planning University of Delaware **1:30pm - 5:00pm** **Evelley**	This workshop is designed to give new practitioners in institutional research a hands-on approach to getting started in the field. Using the NEAIR Monograph "A Handbook for Newcomers to Institutional Research" workshop participants will walk through a series of exercises designed to address such issues as how to ensure data integrity; developing factbooks and reports that are used by college presidents; defining critical issues for institutional research at your college; identifying sources of data; conducting survey research; and developing forecasting models. *Workshop*
Introduction to the Foundations of Total Quality Management and a Model of Continuous Improvement (Part I) **Gregory Lozier** Exec. Dir. of Planning and Analysis Pennsylvania State University **Deborah J. Teeter** Director of IR and Planning University of Kansas **1:30pm - 5:00pm** **Abenia**	This workshop will aquaint participants with the conceptual principles and foundations on which the pursuit of quality relies, as well as with some of the "tools" and methods of TQM. A problem-solving model will be used to illustrate how to apply these principles and tools. Working in teams is an aspect of TQM that will be both practiced and discussed. *Workshop*
Statistics For IR, Session I **MaryAnn Coughlin** Assoc. Prof. of Research& Statistics **1:30pm - 5:00pm** **Triuna A**	In Session I the very basic ideas in statistics will be covered in a way useful as an introduction or as a refresher to statistics. Descriptive statistics, sampling and probability theory as well as the inferential methods of chi square, t-test, and Pearson's r will be covered. *Workshop*
~~**Understanding Campus Culture and Politics**~~ ~~**Dr. J. Fredericks Volkwein**~~ ~~University at Albany~~ ~~**1:30pm - 5:00pm**~~ ~~**Triuna B**~~	This workshop acquaints institutional researchers with campus culture and politics, giving attention to both external environments and internal inner workings. The effectiveness of institutional research is enhanced when professionals understand the historical roots and organizational dynamics of their institutions. Workshop participants will examine those organizational characteristics that make these institutions more or less effective, and will discuss those campus features that have the greatest impact on the practice of institutional research. *Workshop*
5:30pm - 7:00pm	**President's Reception** (Sagamore Dining Room)

Sunday **9:00am - 5:30pm**	**November 7** **Registration - Conference Center Lobby**
Effective Presentations For Institutional Research **Dale Trusheim** Associate Director of Institutional Research and Planning University of Delaware **9:00am - 12:00noon** **Evelley**	This workshop, aimed primarily at newcomers to Institutional Research, has two objectives. The first section of the workshop focuses on key principles of effective data presentation and reporting (design, use of color, tables vs. charts, types of charts, etc.). The second section will demonstrate relatively new computer technology which can also aid effective presentations. Computer getnerated slide shows, transparencies, and slides will be discussed and presented. *Workshop*
Total Quality Management (Session II) **Gregory Lozier** Executive Director Planning and Analysis Pennsylvania State University **Deborah J. Teeter** Director Institutional Research and Planning University of Kansas **9:00am - 12:00noon** **Abenia**	This workshop will aquaint participants with the conceptual principles and foundations on which the pursuit of quality relies, as well as with some of the "tools" and methods of TQM. A problem-solving model will be used to illustrate how to apply these principles and tools. Working in teams is an aspect of TQM that will be both practiced and discussed. *Workshop*
Intermediate Statistics for Institutional Research (Session II) **Mary Ann Coughlin** Associate Professor of Research and Statistics Springfield College **9:00am - 12:00noon** **Triuna A**	Session II will pick up with inferential statistics where Session I leaves off and will discuss such topics as Analysis of Variance, Regression, and Factor Analysis. *Workshop*
Beyond E-Mail: Getting Around On the Internet **James Fergerson** Director Institutional Research Bates College **1:30pm - 5:00pm** **Evelley**	The workshop will be an introduction to the variety of services available on the Internet. Topics covered will be: ftp, telnet, gopher, WAIS, finding information, data, and people on the networks, and news and discussion groups. (A basic understanding of electronic mail will be helpful). *Workshop*

Choosing Technology for the IR Office **Jennifer Wilton** Director Office of Institutional Research University of Massachusetts, Boston **1:30pm - 5:00pm** **Abenia**	This workshop is designed to help those charged with technological decisions, particularly in new offices, to make the best choices possible for their situation. Factors covered will include the impact of the availability of and access to data, tools and technical support and the staffing skills of the office. *Workshop*
~~**Understanding Campus Culture and Politics (Session II)**~~ ~~**J. Fredericks Volkwein**~~ ~~University at Albany~~ ~~**1:30pm - 5:00pm**~~ ~~**Triuna A**~~	This workshop acquaints institutional researchers with campus culture and politics, giving attention to both external environments and internal inner workings. The effectiveness of institutional research is enhanced when professionals understand the historical roots and organizational dynamics of their institutions. Workshop participants will examine those organizational characteristics that make these institutions more or less effective, and will discuss those campus features that have the greatest impact on the practice of institutional research. *Workshop*
Catholic Colleges & Universities **Peter Murray** Catholic University of America **4:00pm - 5:00pm** **Triuna B**	Representatives of Catholic colleges and universities are invited to share experiences and common concerns and to plan activities of mutual benefit. *SIG*
Mentor Program Get-Together **5:00pm - 5:30pm** **Triuna A**	
Rightsizing - A Practical Approach to Cost Reduction and Productivity Enhancement **Robert L. Culver** Senior Vice President and Treasurer Northeastern University **5:30pm - 6:30pm** **Conference Center - Bellvue**	*General Session*
6:30pm - 7:30pm	**Reception & Cash Bar** (Sagamore Dining Room)
7:30pm - 9:30pm	**Banquet** (Sagamore Dining Room)
9:30pm - 10:00pm	**Initial Team Hudles** (Sagamore Dining Room)

Monday	November 8
6:30am - 7:30am	**Fun Run/Walk** (Meet at Main Hotel Entrance)
8:00am - 11:00am	**Registration** (Conference Center Lobby)
7:30am - 8:00am	**Breakfast** (Conference Center - Nirvana)
7:45am - 8:45am	**Special Interest Groups**
Higher Education Data-Sharing Consortium (HEDS) **James Trainer** Director HEDS Consortium **7:45am - 8:45am** **Evelley**	An opportunity for HEDS members and others interested in data exchange activities to discuss current plans and future areas of analysis, with a focus on institutional productivity and cost containment issues. *SIG*
Two-Year Colleges **Alan J. Sturtz** Director Intstitutional Research South Central Community College **7:45am - 8:45am** **Abenia A**	This SIG is intended for individuals dealing or concerned with the IR function in two-year institutions. Problems, concerns, and issues will be discussed in an informal setting. A representative of the National Council for Research and Planning will brief participants on NCRP plans for the coming year. *SIG*
Pennsyvania State System of Higher Education **Richard Rugen** Assistant to the president Planning & Institutional Technology Kutztown University **7:45am - 8:45am** **Abenia B**	Institutional researchers from the State System in Pennsylvania will meet to discuss current issues and concerns *SIG*
ASQ & ASQ+ Users Group **Ellen Armstrong Kanarek** Program Director Applied Educational Research, Inc. **7:45am - 8:45am** **Triuna A**	This session represents an opportunity for those interested in the Admitted Student Questionnaire or Admitted Student Questionnaire Plus to discuss their experiences, have their questions answered, and learn what changes may be planned. *SIG*
~~**Public Universities Information Exchange**~~ ~~**Michael Middaugh**~~ ~~Director of IR & Planning~~ ~~University of Delaware~~ ~~**7:45am - 8:45am**~~ ~~**Triuna B**~~	An opportunity for members of the Exchange and others interested in data exchange activities in public institutions to discuss current plans, with a focus on studies of institutional productivity, staffing, and cost reduction. *SIG*

The Use of NCES National Databases for Institutional Analysis

William H. Freund
Chief
Institutional Studies Branch
National Center for Education Statistics

Susan G. Broyles
Section Head
Institutional Studies, NCES

Roslyn Korb
Mathematical Statistician, NCES

9:00am - 10:00am
Evelley

This panel is designed to help participants gain hands-on experience in the use of several national databases that have rich information for institutional research. Thepanel will map major research issues that can be addressed with these databases, discuss technical issues such as sampling weights and variance computation in analyzing sample survey data, and illustrate and practice the use of PCs to create analysis files and conduct statistical analyses. Procedures for obtaining these databases and technical assistance from NCES will also be discussed in the panel.

Panel
Moderator: John J. Casey, Georgian Court College

Designing Alumni Research for Assessment & Planning

Anne Marie Delaney
Director of Program Research
Boston College

9:00am - 9:45am
Abenia

The purpose of this paper is to present the design, implementation strategies, analytical techniques and significant results from a recently completed undergraduate alumni study administered to School of Education graduating classes from 1987 through 1991. The paper will show how the methodology can be applied to different academic disciplines and professional schools, and how alumni research can be designed and utilized to meet various institutional research purposes including Accreditation, Assessment, Program Evaluation, and Program Planning.

Paper
Moderator: Amy Ensminger, Mansfield Univ. of PA

Salary Equity: Comparison of Two Methodologies

Denise A. Krallman
Institutional Research Analyst
Budgeting, Planning & Analysis
Miami University

9:00am - 9:45am
Triuna A

Salary equity studies have traditionally utilized multiple regression as the method for identifying salary inequities. A new method of studying salary equity was introduced in 1991. The purpose of this study was to use both methods in studying salary equity at Miami University and determining consistency of their results.

Paper
Moderator: Phyliss A. Fitzpatrick, Fairfield University

Key Demographic and Economic Factors Affecting Community Colleges

Marcia M. Lee
Director
Office of Institutional Research & Planning
Westchester Community College

9:00am - 9:45am
Triuna B

This paper seeks to identify the main economic and demographic factors affecting community colleges and discuss them in terms of planning needs for the future.

Paper
Moderator: Arthur Kramer, Passaic County Community College

Inferential Research Methods in Educational Aministration: Benefits and Limitations

Caroline L. Pike
Research Analyst
Office of Institutional Research and Enrollment Planning
Ithaca College

9:55am - 10:35
Abenia

This paper will discuss how research methods may be applied to existing institutional data to address administrative concerns. More specifically, the paper will describe data analysis techniques and how the results of inferential statistical methodologies can be used to inform decision making in the context of freshmen academic experience.

Paper
Moderator: John P. Jacobsen, State System of Higher Ed.

Electronically Accessible Survey Data Using Gopher

Cynthia Lucia
Staff Assistant/
Information Services
Potsdam State College

9:55am - 10:35am
Triuna A

At Potsdam College, we have begun to make survey response data accessible electronically to our campus community. We use client-server "freeware" called Gopher to "publish" the survey responses on the College-Wide-Information-System (CWIS). We encourage academic decision makers to review the narrative data and to make suggestions as to how we could revise it to present the College in the best possible light.

Topical Case Study
Moderator: Richard Kline, California Univ. of PA

Examples of How IR Can Help Campus Administrators

Karen W. Bauer
Senior Research Analyst
Office of Institutional Research and Planning
University of Delaware

9:55am - 10:35am
Triuna B

Many institutional researchers consult with campus colleagues in survey design and analysis. With three survey projects, the presenter will discuss the sequence of events (from initial contact with colleague requesting help through completion of a summary report) and will offer some of the "pleasures" and "nightmares" experienced in each project.

Topical Case Study
Moderator: Daryl Bullock, Mercy College

10:35am - 10:45am	**Break** (Conference Center Lobby)
10:45am - 12:15pm	**Team Case Study Groups** (Conference Center - Bellvue)
12:15pm - 1:45pm	**Business Luncheon** (Conference Center - Nirvana)

Developing a Survey to Assess the Graduate School Experience

Jane Zeff
Assistant Director
Planning, Research & Evaluation
William Patterson College

2:00pm - 2:45pm
Evelley

Session attendees will review a survey being developed for the Graduate Office. Questions seek students' opinions about the quality of graduate services, library holdings, and the programs they have just completed. Other questions explore how students financed their graduate education and the reasons why they pursued an advanced degree.

Topical Case Study
Moderator: Denise A. Krallman, Miami University

An Analysis of Entering Freshmen Survey Data As It Relates to Retention of Students

Linda LeFauve
Research Associate
Office of Institutional Analysis
State University of New York
at Buffalo

Mark L. Molnar
Senior Programmer
Office of Institutional Analysis
SUNY at Buffalo

2:00pm - 2:45pm
Abenia

Freshman Survey data were analyzed to determine which variables were related to retention/graduation. Variables included were students' concern about financing their education, self-ratings of intellectual/social abilities, reasons for going to college and expectations of the college experience, and educational plans. Results of the analysis and programming issues will be discussed.

Paper
Moderator: Richard Rugen, Kutztown Univ. of PA

Making the Most of the Mission Review

Eleanor Fujita
Director
Institutional Research
Hudson Community College

2:00pm - 2:45pm
Triuna A

A multi-faceted approach to the review of the college's mission was used as an opportunity for institutional renewal and as a tool for understanding and improving the college's image within and without the college.

Topical Case Study
Moderator: James Stager, Millersville Univ. of PA

Using ASQ to Determine Cognitive Fit Between Incoming Students and Future Enrollment

Yun K. Kim
Director
Office of Institutional Research
Goucher College

2:00pm - 2:45pm
Triuna B

The college-fit theory and cognitive consistency and dissonance theories could offer some explanation on student attrition. This study will use three years of Admitted Student Questionnaire data to develop college image types and learn which pre-enrollment image type is most likely to predict the future enrollment behavior.

Paper
Moderator: Eleanor Swanson, College of New Rochelle

Putting the Real Focus Into Focus Groups

Anita Dubey

Mike Fusco
Director
Marketing, Bentley College

2:55pm - 3:35pm
Evelley

Using videotape clips, props, sample topic guides, and other collateral material, this presentation will demonstrate how to execute focus groups quickly, cheaply, and in a variety of settings. Examples from over 30 groups, conducted over an 18 month period, will be used to demonstrate how to satisfy objectives from publications development to customer service. This session will be of interest to those who would like to have a quick overview of focus groups and will also provide helpful hints to those who have previously conducted focus groups.

Demonstration

A Review of the Writing Sample as an Index of Program Effectiveness

Stanley S. Jacobs
Office of Planning and
Institutional Research
Villanova University

Mary Ann Ausetts
Institute for Survey Research
Temple University

2:55pm - 3:35pm
Abenia

A review of research concerning the reliability, validity and useability of the writing sample as a special case of the essay examination was presented. The period since 1965 was emphasized. Of particular concern was the utility of the writing sample as a measure of the effect of the undergraduate experience.

Paper
Moderator: James Ritchie, University of Pittsburgh

Influence of Background Variables on Students' Evaluations of Faculty

Stuart L. Rich
Director
Institutional Research
Georgetown University

2:55pm - 3:35pm
Triuna A

The literature on students' evaluations of faculty yields conflicting evidence on the influence of background variables (course level, class size, discipline, grades sex and rank of faculty, *e.g.*) on ratings. Two years of course evaluations were examined to determine the relationship of these variables to faculty evaluations at a highly selective private university.

Paper
Moderator: Marion Pagano, Columbia University

Analysis of Funding Patterns for Federally Sponsored Research in Science & Engineering 1981-1991

James Trainer
Director
HEDS
Franklin and Marshall College

2:55pm - 3:35pm
Triuna B

This paper provides a longitudinal analysis of federally funded research in science and engineering for the period 1981-1991. It examines the allocation of funds to institutions over time and explores shifts in the sources of funds vis-a-vis various federal agencies. Data are sorted and analyzed by 13 agencies and 8 disciplines. The paper serves as an introduction to the use and availability of federal databases.

Paper
Moderator: Walter Liss, Tufts University

3:35pm - 3:45pm

Break (Conference Center Lobby)

Time to Degree Completion

Wendell G. Lorang
Associate Director
Institutional Research
SUNY - Albany

Craig Billie
Associate
Institutional Research
SUNY Central Administration

3:50pm - 4:30pm
Evelley

This paper presents a statistical profile and analysis of the differences between students who completed a baccalaureate degree within four years and those students who took longer than four years to graduate. This study presents the methodology and results for nearly 12,000 bachelor's degree recipients in the State University of New York system in 1991-92 and compares these results with those from the University at Albany, a large research university within the SUNY system.

Paper
Moderator: George T. Force, Slippery Rock Univ. of PA

Developing Reliability Data for the ASQ Plus

Ellen Armstrong Kanarek
Program Director
Applied Educational
Research, Inc.

3:50pm - 4:30pm
Abenia A

This presentation describes the steps involved in evaluating the consistency of the ratings of the same colleges by the same students responding to Admitted Student Questionnaire Plus surveys mailed by two different colleges. Some of the issues examined include: identifying students completing more than one questionnaire; setting up the data file; choosing appropriate comparisons; interpreting the results.

Topical Case Study
Moderator: Richard C. Heck, Colgate University

Trends In Campus Crime

Bruce Szelest
Associate
Institutional Research
University at Albany

Fredericks Volkwein
Director
Institutional Research
University at Albany

3:50pm - 4:30pm
Abenia B

This research merged several national databases containing federal crime statistics, community demographic data, and campus characteristics. The study displays the trends in campus crime since 1974, and using 1990 data from over 390 campuses, examines the relationships between campus crime and college characteristics.

Paper
Moderator: Ann L. Henderson, Skidmore College

A Critical Multiplist Evaluation of Developing Reading Instruction at Suffolk Com. Col.

Anthony Napoli
Suffolk Community College
and Department of Psychology
SUNY at Stony Brook

Paul Wortman
Department of Psychology
SUNY Stony Brook

Christina Norman
Department of Psychology
SUNY Stony Brook

3:50pm - 4:30pm
Triuna A

Three quasi-experimental studies are presented which lend support for the positive effects of developmental reading courses on reading comprehension levels. Study 1 used a regression-discontinuity design to test the effects of the developmental reading course on overall grade point average. Possible "mortality" bias was ruled out in Study 2 using a nonequivalent control group design. Study 3 used a single group pretest-posttest design to assess the effectiveness of the developmental reading course on improving reading comprehension skills. Significant pre- to post-test gains were found.

Paper
Moderator: Larry Metzger, Ithaca College

~~Why Do Students Seek Employment? Summary Results of National Student Survey Responses~~

~~**Yuko Mulugetta**~~
~~Senior Research Associate~~
~~Office of Financial Aid and Student Employment~~
~~Cornell University~~

~~**3:50pm - 4:30pm**~~
~~**Triuna B**~~

The study presents results of the National Student Employment Survey, which involves over 4,500 responses. The study found that students seek employment for financial as well as educational/career enrichment purposes.

Paper
Moderator: Thomas Flaherty, Central CT State Univ.

4:30pm - 5:30pm	**Team Case Study Groups** (Conference Center - Bellvue)
6:00pm - 7:00pm	**Reception, Cash Bar & Hors D'Eouvres** (Sagamore Dining Room)
7:00pm - 12:00pm	**Dinner and Karaoke** (Sagamore Dining Room)

Tuesday	**November 9**
6:30am - 7:30am	**Fun Run/Walk** (Meet at Main Hotel Entrance)
7:30am - 8:30am	**Breakfast** (Conference Center - Nirvana)
Robert Morse U.S. News & World Report **7:30am - 8:30am** **Evelley**	Bring your breakfast and come and discuss the most recent U.S. News' "America's Best College Values". All are welcome. Bring your criticisms, compliments, questions, or suggestions of any kind.
8:00am - 9:00am	**Conference Evaluations (Invited Interviews)**(Nirvana)
Student Right-to-Know and Graduation Rate Data **Roslyn Korb** Chief of Cross-Sec. Studies Branch NCES **Nancy B. Schantz** Statistician Cross-Sectional Studies Branch NCES **Susan G. Broyles** Section Head of Student Surveys Inst. Studies Branch, NCES **9:00am - 10:00am** **Evelley**	This presentation will address the current status of the SRK regulations and related compliance issues. In addition, presenters will discuss plans for pretesting the National Center for Education Statistics' (NCES) Graduation Rate Survey and incorporating the survey into the IPEDS data collection cycle. Audience participation is encouraged. *Panel* Moderator: Jane Zeff, William Paterson College
No Pain, No Gain: How One College Emerged Stronger From the Fiscal Crisis **Craig A. Clagett** Director Institutional Research & Analysis Prince George's Comm. College **9:00am - 9:45am** **Abenia**	Can a college benefit from a ten percent budget cut? After describing the measures adopted by a Maryland community college to meet this emergency, including introduction of an unusual differential fee structure based on discipline costs, the paper argues that the fiscal crisis provided the impetus for implementation of a number of reforms long contemplated but never adopted by the college. Implications of this "crisis as catalyst" model for planning theory will be discussed. *Paper* Moderator: Stuart L. Rich, Georgetown University
Organizational Sources of Disparities Between Male and Female Faculty Salaries **Catherine E. Regan** Research Associate SUNY System **Fredericks Volkwein** Director Institutional Research University at Albany **9:00am - 9:45am** **Triuna A**	This research explores both organizational and individual sources of salary differences between male and female faculty. Drawing upon a database of 6,536 full-time faculty at a variety of research, doctoral, comprehensive, medical, and two-year institutions, the study uses multivariate analysis to examine the influences of organizational size, wealth, and complexity (in addition to the traditional measures that indicate a faculty member's education, work experience, rank, and discipline). *Paper* Moderator: Linda M. LeFauve

Outreach Programs and Their Varying Impact on Key Market Segments **David J. Costello** Dean Enrollment Planning Newbury College **9:00am - 9:45am** **Triuna B**	The outreach efforts of many institutions are extensive and, more importantly, expensive. With each passing year, the recruitment effort among colleges for qualified students has increased. What has not maintained pace with this increased effort, is the management and assessment of specific outreach programs. This paper analyzes how various outreach programs impact key market segments (quality applicants, financial aid applicants, housing applicants, etc.). *Paper* Moderator: Yun Kim, Goucher College
How Insensitive Can You Get? Further Analysis of the 'Best Colleges' Rankings **Michael McGuire** Director Institutional Research Franklin & Marshall College **9:55am - 10:35am** **Abenia**	This session will feature the results of sensitivity analyses of the 1992 'Best Colleges' data for the National Liberal Arts category. Shifts in institutions' ranks were observed under three alternative weighting scenarios constructed from data obtained in a 1992 survey of college presidents, admissions directors, and academic deans. Explanations for the shifts in rankings will be offered, and the implications of the 'Best Colleges' model's instability for both the institutions affected by those shifts and the consumer audience will be discussed. *Paper* Moderator: Joseph Revelt, Shippensburg Univ. of PA
Analytical Techniques for Studying Student Retention **Anne Marie Delaney** Director Program Research Boston College **9:55am - 10:35am** **Triuna A**	The purpose of this paper is to present the design and analytical techniques employed in retention studies that have produced information responsive to the questions and concerns of university administrators. Proposed enhancements to these studies - to include socially relevant variables and to meet anticipated 'Right-to-Know' information requirements - will also be discussed. Three topics to be addressed in the paper include: Data Requirements for a Longitudinal Retention File, Logic for Developing Computer Programs, and Analytical Techniques for Predicting Retention. *Paper* Moderator: Ellen Armstrong Kanarek, Applied Ed. Rsch.
Topical Case Study on Salary Compression and Inversion **Denise A. Krallman** Institutional Research Analyst Budgeting, Planning & Analysis Miami University **9:55am - 10:35am** **Triuna B**	A study was conducted this year at Miami University to look at the issue of salary compression (and in an extension of this study - salary inversion). Discussion will center on how best to identify salary compression and inversion so that inequalities can be addressed. *Topical Case Study* Moderator: Eleanor Fujita
10:35am - 10:45am	**Break** (Conference Center Lobby)
10:45am - 12:00noon	**Team Case Study Presentations** (Conf. Ctr. - Bellvue)
1:00pm - 4:00pm	**Steering Committee Meeting** (Evelley)

1992-93 Steering Committee

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Examples of How Institutional Research Can Help Campus Administrators with Their Survey Research Needs

Karen W. Bauer, Ph.D.
Senior Research Analyst
Office of Institutional Research & Planning
The University of Delaware

At most institutions, institutional research staff members act as consultants to other campus administrators for departmental or other survey needs. This consultancy role in survey research is only one, but a very important role that many IR members embrace. Involvement in the design, analysis, and completion of a summary report can be a pleasant challenge.

Over the past year, I have been asked to become involved in the design and analysis of several surveys that were eventually distributed to specific populations within the campus community. I offer, not as an expert, but as a dedicated institutional researcher, the "trials and tribulations" of my experiences with these research projects with the hope that you might learn something from my experiences.

Like many Institutional Research offices today, our total number of staff members has been reduced. Expanding responsibilities in budget planning and support, enrollment management, and completion of the myriad internal and external ad-hoc surveys (including annual surveys from such places as Peterson's Guide, NASULGC, IPEDS, NCAA, and regional accrediting associations) all compete for each staff member's time and energies. In our Office of Institutional Research & Planning at the University of Delaware, the four professional staff members have created a team approach in order to accomplish our tasks. With a tenure of at least five years, we have each created our own niche or "specialty" area. Whenever possible, our director tries to assign tasks that fit within our specialty. There are advantages to such strategic assignments-- efficiency and accuracy of task completion, and happiness of the staff member to utilize and strengthen his or her personal knowledge and skill.

Recent Survey Projects

During the 1992-93 academic year at UD, I coordinated the design and analysis of the following survey projects:

Fall 1992 Freshman Survey
Parents Evaluation of New Student Orientation
Preview Day
CORE Alcohol and Drug Use Survey
Classroom Participation Survey
Salaried Staff Survey
Part-Time Child Care Needs
Personal, Career, and Learning Skills Needs Survey
Campus Climate Scale
Health Services Evaluation

Sexual Experiences (Harassment) Survey

Through four examples, I will share the sequence of events that transpired from the time I received the initial phone call requesting help through completion and distribution of a summary report. Throughout my work on these projects, I have learned a great deal, and I offer you some of the positive and negative points learned from each.

Parents' Evaluation of New Student Orientation

At The University of Delaware, the IR Office works closely with the Admissions Office to share data, produce enrollment projections, and complete a number of external surveys (e.g., US News & World Report annual survey, Money Magazine, etc.) In a collegial spirit, our office has for many years helped the Admissions Office with evaluation needs such as those for Campus Tours, Preview Days, and New Student Orientation. A copy of the 1992 Parents' Evaluation of New Student Orientation is attached in Appendix 1.

Sequence of Events

1. Received call from NSO Director requesting help
2. Get last year's NSO survey from files
3. Meet with NSO director - determine if we can edit last year's survey or need to completely redesign
4. Draft survey, get final approval from NSO director
5. Share draft of survey with director of data entry; get her approval
6. Edit last year's SPSS program
7. Throughout summer NSO, receive daily/weekly bundles of completed surveys
8. Manually scan to see that surveys have been completed correctly; collate open-ended comments
9. Send to data entry
10. Receive data files from data entry
11. Combine data files and run SPSS to analyze data
12. Share initial findings with IR staff
13. Share initial findings with NSO director; determine if ant specific analyses desired. Usual analyses include frequencies and crosstabs.
14. Draft summary report
15. Share summary report with IR staff
16. Submit final summary report to NSO Director who will in turn share with her director and orientation colleagues.

Less Than Positive Experiences With This Project

1. New data entry procedures required me to extend my efforts at accurately aggregating data files

Positive Experiences With This Project

1. Survey is easy to complete, easy to scan for errors
2. Designed for ease in data entry.
3. Survey is relatively the same from year to year, so my start up time is reduced to a minimum.
4. NSO staff tally open-ended comments, so again my time involved in analysis is reduced.
5. NSO staff is especially gracious and appreciative of the summary report that is written, but feels free to comments on the report.

II. CORE Alcohol and Drug Use Survey

Sequence of Events

1. Dean of Students and Vice President for Student Affairs asked how we as an institution could look at this problem
2. I checked our files, gathered info from library, ask IR colleagues, to learn that nothing had been done on our campus for at least past 10 years
3. I recommended that we begin by gathering baseline data
4. Began literature review- obtained relevant documents from library, Dean of Students, other colleagues
5. Called friends at several other campuses to see what they were doing , asked for copies of surveys they had used
6. Visited George Mason Univ. Center for Drug & Alcohol Use; learned of Washington, DC, area consortium on College Alcohol Use
7. Made decision to use CORE Alcohol & Drug Use Instrument - See Appendix 2
8. After discussions with VP Student Affairs and Dean of Students, prepared draft of proposal to go to President
9. Proposal finalized and signed by VP Student Affairs, Dean of Students, Director of IR, and me.
10. Received approval with no modifications from President
11. Requested and received approval from University Human Subjects Committee
12. Ordered surveys, envelopes, mailing labels
13. Selectively chose approximately 20 classrooms for survey administration. Specifically looked for classes with large enrollments and variety of majors.
14. Verified students enrolled in these classes to ensure representation of all students by sex, class level, ethnicity,and major.
15. Sent personalized letter to each faculty member asking for admittance to administer survey during first or last 15 minutes of class during specified week.
16. Most said yes, a few said no-- so had to choose a couple more classes.
17. Reverified breakdowns by class, sex, ethnic, and major
18. Created schedule for entry into each classroom
19. Replied to each faculty member with date and time

20. Administered survey; elicited help from office work study student on a few occasions when two classes were scheduled at once
21. Manually scanned sheets to check for accuracy of completion
22. Mailed surveys to company in Minnesota for scoring
23. About two weeks later, received diskette of data and printed copy of frequencies
24. Completed additional analyses- mostly frequencies, crosstabs, T-test, MANOVA
25. Shared initial findings with IR staff, then VP Student Affairs
26. Submitted summary report to VP Student Affairs
27. Shared summary report with faculty who requested it
28. VP created task force to further examine campus practices, programs.

Less Than Positive Experiences With This Project

1. Very time consuming during scheduling and week of administration It took a great deal of time and effort to choose classes, verify breakdowns, send letters to faculty, coordinate logistics of entering each classroom. I was literally running from one classroom to another!
2. Didn't anticipate everything-- Learned on first day that not everyone had pencils, so had to run out and buy pencils
3. Had to deal with a few faculty with uncooperative attitudes
4. Frustrations with little action occurring after survey results distributed.

Positive Experiences With This Project

1. Getting President's approval was a key in this project's success
2. I worked hard to get permission to administer in classes; felt a sense of satisfaction; allowed me to more closely control atmosphere under which survey was completed.
3. Was good to work with faculty-- collegiality, politically
4. We helped Student Affairs obtain good baseline data
5. Having normative data was very helpful- showed where UD students were above and below other norms
6. Was a relatively inexpensive survey
7. Developers at So. Illinois were especially helpful on phone
8. Purposefully built in three year timeline for follow-ups
9. I learned a lot about college student drug and alcohol use
10. I was asked to present study results to a graduate class

III. Gender Differences In Classroom Participation

Sequence of Events

1. Attended meeting of Commission on Status of Women in which student constituency discussed several projects of interest
2. I helped them narrow and prioritize issues; plan to address chilly climate issues
3. Did extensive literature review to understand chilly climate; obtained relevant articles and studies
4. Obtained similar study that was conducted at UD in 1983
5. Developed and refined methodology- See Appendix 3
6. After two revisions obtained approval from Psychology Department Human Subjects Committee
7. Sent letter to all department chairs informing them that this observation would take place
8. Completed pilot study - Spring 1992
9. Shared pilot study results with Commission on Status of Women
10. Requested and obtained approval from Human Subjects Committee for full study- Fall 1992
11. Obtained additional counsel from IR director and senior level administrators
12. Sought, found, and trained three student research assistants
13. Used SPSS to randomly select classes with specific criteria; randomly assigned research assistants to classes
14. Monitored observers throughout the week of observations
15. RAs returned completed sheets to me
16. Some sheets weren't complete, so had to follow-up with RAs
17. Completed inter-rater reliability checks
18. Completed full analysis
19. Shared findings with IR staff
20. Submitted summary report to Commission on Status of Women

Less Than Positive Experiences with This Project

1. Very time consuming- some weeks about 20-25% of my time
2. During pilot study, one department chair telephoned to inquire about the study and threatened to personally submit my name to faculty senate for unethical behavior
3. Frustrating when student observers didn't live up to my expectations
4. Frustrations with primary student researcher who presented findings from the study at a campus research conference

Positive Experiences With This Project

1. Was very exciting to be doing 'experimental' research
2. I felt that this study was very important and could contribute to the status of women in higher education

3. I was completing past of my assigned duties in providing the Commission on Status of Women with data and related information.
4. By modeling previous research, it was easier to make refinements to already existing methodology. Also- because this was so politically hot, the previous study in 1983 served as a precedent.
5. I became much more aware of the political climate on campus; changed some of my naivete
6. This research helped me become really interested in the chilly climate issue and has moved me to a new level of interest in gender differences.

IV. Longitudinal Study

Sequence of Events

1. Completed a follow-up with CSEQ in Spring 1992, really saw the benefits of longitudinal studies.
2. Continued to read, did additional literature reviews, saw the benefits of longitudinal work
3. Submitted grant proposal to UD for grant $$- was turned down- Fall 1991
4. Sent letter to Provost's Office requesting funds for study- was turned down- Spring 1992
5. IR Director continued to support the idea, encouraged me to keep trying
6. Submitted grant proposal to NEAIR grants committee- Fall 1992
7. Received word that I would receive funding from NEAIR - Spring 1993
8. Reviewing costs over 4-5 years, I decided to change primary instrument; asked NEAIR grants committee for approval to change from more expensive published instrument to one developed at SUNY-Albany-- See Appendix 4
9. Committee Ok'd changes, made award.
10. Once received $$, took check to University grants office, they set up account for my project.
11. Received OK from data entry
12. Ordered copies of survey to be reproduced
13. Surveys put in freshman packets, completed at New Student Orientation
14. Completed surveys sent to me
15. Surveys manually scanned for accuracy; four letter major code entered
16. Surveys sent to data entry
17. Created SPSS command program for analysis
18. Received keyed surveys from data entry
19. Have just begun analysis

Less Than Positive Experiences with This Project

1. Requires incredible tenacity, persistence, dedication to the project
2. Getting turned down for grant funds was a downer
3. Thought it would be easier to get funding- costs of project required me to change from published instrument (with national norms) to one that was locally-developed

Positive Experiences with This Project

1. Am pleased to begin a study that I've wanted to do for some time- this gives me new energy
2. I was able to obtain large initial sample through NSO administration
3. We will know a great deal about this cohort of students - not only demographically, but hopefully we will also gain insights into the process of learning, how students change from year to year
4. I feel lucky to be one of relatively few researchers who get to do such a longitudinal study
5. Creates possible new ties with inter-institutional data comparisons.

Appendix 1

1990 NEW STUDENT ORIENTATION
PARENTS' EVALUATION

Thank you for taking the time to complete this evaluation. Your responses will help us in planning future summer programs. Read each question carefully and write the number of your response in the box at left. Please leave this evaluation form in one of the boxes at the back of the auditorium before leaving today.

				9	0	TODAY'S DATE (for numbers below 10 enter 01, 02, etc.)
MONTH		DAY				

☐ A. Person filling in this questionnaire is:

1. Mother
2. Father
3. Both parents
4. Other (Please specify)______________________________

☐ B. Are you a resident of:

1. Delaware
2. Out-of-state

C. How satisfied were you with the following aspects of the New Student Orientation? Using the scale below, enter the appropriate number (1-5) corresponding to your rating in the box at the left hand side of the event.

1. Very Satisfied
2. Satisfied
3. Somewhat Satisfied
4. Very Dissatisfied
5. Did Not Attend

☐ Welcome and Announcements

☐ Academic Life: Creating an Intellectual Adventure

☐ Student Affairs: Maximizing the University Experience

☐ Counseling and Student Development: Easing Students' Transition

☐ Residence Life: Building a Dynamic Community

☐ Off-campus Living: Becoming a Part of the Student Body

☐ Lunch

☐ Students: "Tell It Like It Is"

☐ Dollars and Sense: Answering Questions About Paying the Bills

☐ University Honors Program (Parents of students admitted to the Program)

(Cols 1-16)

(Continued on reverse side)

Appendix 2

Form 191

Core Alcohol and Drug Survey

For use by two- and four-year institutions

FIPSE Core Analysis Grantee Group

USE NO. 2 PENCIL ONLY

Please use a number 2 pencil.

Processed by: UCS/Office of Measurement Services
University of Minnesota
2520 Broadway Drive - Room 130
St. Paul, MN 55113

For additional use: [illegible]

A ⓪①②③④⑤⑥⑦⑧⑨
B ⓪①②③④⑤⑥⑦⑧⑨
C ⓪①②③④⑤⑥⑦⑧⑨
D ⓪①②③④⑤⑥⑦⑧⑨
E ⓪①②③④⑤⑥⑦⑧⑨

1. Classification:

- Freshman .... ○
- Sophomore .... ○
- Junior .... ○
- Senior .... ○
- Grad/professional ..... ○
- Not seeking a degree .... ○
- Other .... ○

2. Age:

☐☐

⓪	⓪
①	①
②	②
③	③
④	④
⑤	⑤
⑥	⑥
⑦	⑦
⑧	⑧
⑨	⑨

3. Ethnic origin:

- American Indian/Alaskan Native ...... ○
- Hispanic .... ○
- Asian/Pacific Islander.. ○
- White (non-Hispanic)... ○
- Black (non-Hispanic)... ○
- Other .... ○

4. Marital status:

- Single .... ○
- Married .... ○
- Separated .... ○
- Divorced .... ○
- Widowed .... ○

5. Gender:

- Male .... ○
- Female .... ○

6. Is your current residence as a student:

- On-campus .... ○
- Off-campus .... ○

7. Are you working?

- Yes, full-time .... ○
- Yes, part-time .... ○
- No .... ○

8. Living arrangements

A. Where: *(mark best answer)*

- House/apartment/etc... ○
- Residence hall .... ○
- Approved housing ..... ○
- Fraternity or sorority ... ○
- Other .... ○

B. With whom: *(mark all that apply)*

- With roommate(s)...... ○
- Alone .... ○
- With parent(s)......... ○
- With spouse .... ○
- With children .... ○
- Other .... ○

9. Approximate cumulative grade average: *(choose one)*

○	○	○	○	○	○	○	○	○	○	○	○	○
A+	A	A–	B+	B	B–	C+	C	C–	D+	D	D–	F

10. Some students have indicated that alcohol or drug use at parties they attend in and around campus reduces their enjoyment, often leads to negative situations, and therefore, they would rather not have alcohol and drugs available and used. Other students have indicated that alcohol and drug use at parties increases their enjoyment, often leads to positive situations, and therefore, they would rather have alcohol and drugs available and used. Which of these is closest to your own view?

	Have available	Not have available
With regard to drugs?	○	○
With regard to alcohol?	○	○

11. Student status:

- Full-time (12+ credits)... ○
- Part-time (1-11 credits).. ○

12. Campus situation on alcohol and drugs:

	yes	no	don't know
a. Does your campus have drug and alcohol policies?	○	○	○
b. If so, are they enforced?	○	○	○
c. Does your campus have a drug and alcohol prevention program?	○	○	○
d. Do you believe your campus is concerned about the prevention of drug and alcohol use?	○	○	○
e. Are you actively involved in efforts to prevent drug and alcohol use problems on your campus?	○	○	

13. Place of permanent residence:

- In-state .... ○
- USA, but out of state... ○
- Country other than USA. ○

14. Think back over the last two weeks. How many times have you had five or more drinks* at a sitting?

- None .... ○
- Once .... ○
- Twice .... ○
- 3 to 5 times .... ○
- 6 to 9 times .... ○
- 10 or more times ...... ○

*A drink is a bottle of beer, a glass of wine, a wine cooler, a shot glass of liquor, or a mixed drink.

15. Average # of drinks* you consume a week

☐☐

(If less than 10, code answer as 01, 02, etc.)

⓪	⓪
①	①
②	②
③	③
④	④
⑤	⑤
⑥	⑥
⑦	⑦
⑧	⑧
⑨	⑨

16. At what age did you first use... *(mark one for each line)*

	Never	Under 10	10–11	12–13	14–15	16–17	18–20	21–25	26+
a. Tobacco (smoke, chew, snuff)	○	○	○	○	○	○	○	○	○
b. Alcohol (beer, wine, liquor)*	○	○	○	○	○	○	○	○	○
c. Marijuana (pot, hash, hash oil)	○	○	○	○	○	○	○	○	○
d. Cocaine (crack, rock, freebase)	○	○	○	○	○	○	○	○	○
e. Amphetamines (diet pills, speed)	○	○	○	○	○	○	○	○	○
f. Sedatives (downers, ludes)	○	○	○	○	○	○	○	○	○
g. Hallucinogens (LSD, PCP)	○	○	○	○	○	○	○	○	○
h. Opiates (heroin, smack, horse)	○	○	○	○	○	○	○	○	○
i. Inhalants (glue, solvents, gas)	○	○	○	○	○	○	○	○	○
j. Designer drugs (ecstasy, MDMA)	○	○	○	○	○	○	○	○	○
k. Steroids	○	○	○	○	○	○	○	○	○
l. Other illegal drugs	○	○	○	○	○	○	○	○	○

*Other than a few sips

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Appendix 3

CLASSROOM INTERACTION STUDY
TALLY SHEET

Today's Date __/__/__

Course Classification:______________________________ Level: _____ Upper _____ Lower

Length of class: _____50 minutes _____ 75 minutes _____ 150 minutes

Sex of Instructor: _____ Male _____ Female

Number of students attending: _____ Male _____Female

Student contributions offered - hands raised to speak.

Men

Women

Student contributions - made

Men Long (5 seconds or longer)

Short (less than 5 seconds in length)

Women Long (5 seconds or longer)

Short (less than 5 seconds)

Feedback From Instructor

To Male Students: Positive

Negative

Neutral

None

To Female Students: Positive

Negative

Neutral

None

Other Instructor or Student Remarks. On the back, please describe briefly any positive, negative, or neutral comments and other behaviors made by instructor or student.

(Revised Fall 1992)

UNIVERSITY OF DELAWARE

Appendix 4

Fall 1993 INCOMING STUDENT SURVEY

You have been selected as part of a special group of first-year students to participate in a longitudinal study at the University of Delaware. The information below is being collected by The Office of Institutional Research in order to gain a better understanding of college students and to improve the quality of programs and services. Your voluntary participation in this study will help us achieve these goals. Please complete the information below completely and accurately. All responses are confidential and data will be reported only in the aggregate. Each year you will be recontacted and asked to complete a survey about your experiences at Delaware. We ask that you include your student ID (SSN) so that we can keep all of your information together. Thank you for helping us learn about your college experiences at Delaware.

1. Student ID# ______________________ Are you a: _____ New Freshman _____ Transfer Student

2. Will you be living on campus this fall? (Circle one) A. Yes B. No

3. How well do you feel that your high school prepared you in the following areas? (Please circle one number in each row.)

	Not at All		Moderately		Extremely Well
a. Mathematical skills	1	2	3	4	5
b. Writing and composition	1	2	3	4	5
c. Foreign languages	1	2	3	4	5
d. Sciences	1	2	3	4	5
e. American and World History	1	2	3	4	5
f. Social issues (race rel., drug abuse, etc)	1	2	3	4	5
g. Art/Music/Drama	1	2	3	4	5
h. Study skills	1	2	3	4	5

4. During your last year of high school, approximately how many hours per week, on the average, did you:
spend on homework: __________ read school-related books: __________
spend at the library: __________ use a computer to play games: __________
use a computer for school or homework: __________

5. What was your high school GPA? ________________

6. Students come to college with different goals. Please indicate how important each goal is for you by circling the number.

	Level of Importance				
	None		Moderate		Essential
a. To gain a broad, liberal arts education and appreciation of ideas	1	2	3	4	5
b. To gain knowledge and skills directly applicable to a career	1	2	3	4	5
c. To learn to think creatively and analytically	1	2	3	4	5
d. To learn more about myself, my values, and my life's goals	1	2	3	4	5
e. To learn more about other languages and cultures	1	2	3	4	5

7. What is your major? ______________________________________

8. What is the highest degree you expect to obtain? (Circle One)
   1. Bachelor's degree
   2. Master's degree or equivalent (MA, MS, MBA, MPA, etc.)
   3. Terminal degree or equivalent (PhD, EdD, MFA, MD, JD, PsyD)

9. Do you feel confident that you have adequate finances to pay your University of Delaware bill throughout your baccalaureate program? _____ Yes _____ No

UNIVERSITY OF DELAWARE

(Spring 1992 draft)

Appendix 5

Spring 1994 STUDENT SURVEY

Last fall you completed a questionnaire when you entered the University. We are asking you to give us additional information now that you are near the end of your second semester of study at Delaware. Your voluntary participation will help us improve the quality of programs and services, especially for freshmen and other new students. We need your name and social security number in order to follow-up with non-respondents and to link your responses to the ones you gave us last fall. However, all responses will be held in strict confidence and used only in group summaries for research, planning and program purposes. Please return by April 15 in the enclosed envelope to the Office of Institutional Research. Thanks very much for your help.

PLEASE ENTER YOUR RESPONSES ON THIS SHEET

1. Student ID # ______________________

2. During the past academic year, approximately how may hours per week, on the average, did you spend in these activities:

	Hours Per Week	
	FALL	SPRING
Studying outside of classes and labs	_______	_______
On-Campus Employment (including work/study)	_______	_______
Off-Campus Employment	_______	_______
Sports, intramurals & Physical fitness	_______	_______
Clubs, organizations, student activities, volunteer services, fraternities, sororities (Excluding sports)	_______	_______

3. Please estimate the NUMBER OF TIMES during this past year that you have met with a faculty member outside the classroom for each of the reasons listed. Count only conversation of 10 minutes or more.

	Number of Times Met With	
	A Faculty Member	Another Univ. Staff Member
a. To discuss your academic program	_______	_______
b. To discuss matters related to your future career	_______	_______
c. To help resolve a disturbing personal problem	_______	_______
d. To discuss intellectual or course-related matters	_______	_______
e. To discuss a campus issue or problem	_______	_______
f. To socialize informally	_______	_______

4. In which academic field do you expect to major? ______________________________
(If undecided, please so state): ______________________________

5. How many times during 1993-94 have you changed your plans for an academic major?	NONE 1	ONCE 2	TWICE 3	THREE TIMES 4	FOUR OR MORE TIMES 5
6. How great was the change in your plans?	Complete Change 1	Large Change 2	Moderate Change 3	Slight Change 4	No Change 5
7. How was your satisfaction with the University changed since you first entered Delaware?	More Satisfied 1	About the Same 2	Less Satisfied 3		

No Pain, No Gain: How One College Emerged Stronger from the Fiscal Crisis

Craig A. Clagett
Director, Institutional Research and Analysis
Prince George's Community College

> *Unless challenged, every organization tends to become slack, easygoing, diffuse. It tends to allocate resources by inertia and tradition rather than results. Above all, every organization tends to avoid unpleasantness. And nothing is less pleasant and less popular than to concentrate resources on results, because it always means saying "No."*
>
> Peter Drucker

Introduction

Historically, Prince George's Community College (PGCC) has been among the most cost-efficient community colleges in Maryland. Its overall cost per student has consistently been among the lowest in the state, a situation forced upon the College due to comparatively low levels of county support. According to past state guidelines, community colleges in Maryland were to receive 50 percent of their revenues from the state, 28 percent from their local jurisdiction, and 22 percent from students. The actual proportions have deviated from these guidelines. Statewide, the 16 locally-governed community colleges received 27 percent of their FY92 funding from the state, 37 percent from their respective counties, 35 percent from students, and 2 percent from other sources. Prince George's County contributed 26 percent of PGCC's budget in FY92. An analysis of county support for community colleges in Maryland found that, by most measures, PGCC received about half the level of local aid that peer colleges in neighboring jurisdictions received (Clagett, 1992).

Largely because of the above situation, PGCC was hit especially hard by the state fiscal crisis of the early 1990s. State revenue shortfalls, combined with mandated Medicaid and welfare expenditures, led to substantial cuts in state aid to higher education institutions in Maryland. The impact on PGCC was felt through three consecutive years of mid-year state funding reversions:

Direct State Aid to PGCC

Year	Budgeted	Reversion	Received
FY90	$11,367,820	$0	$11,367,820
FY91	11,679,772	822,912	10,856,860
FY92	11,583,160	2,768,655	8,814,505
FY93	11,588,980	1,038,258	10,550,722

In addition, in FY92 the state contribution to FICA and employee retirement systems for PGCC employees was cut nearly $1 million. The college had to fund this shortfall.

As can be seen from the above table, the major budget hit took place in fiscal year 1992. The state funding reversion for that year consisted of a nearly one-fourth reduction in direct aid, plus a similar reduction in the state's contribution to college FICA and retirement systems. This resulted in an effective 33 percent cut in state assistance to PGCC, as the College had to make up the cut in the FICA/retirement contribution. In dollars, the total cut amounted to nearly $3.8 million, or ten percent of the College's total budget of $38.4 million. In addition to the state aid cut, the County eliminated a planned $1.1 million dollar increase in aid to PGCC, providing the College with the same local aid in FY92 that it had received in FY91.

Meeting the Revenue Shortfalls

To meet the immediate FY92 crisis, the College implemented several cost containment measures. These included a freeze on hiring, elimination of all conference travel, elimination of all professional development and training, and a freeze on all equipment purchases. Only essential purchases of supplies and materials in direct support of instruction or safeguarding life and property were permitted.

An employee furlough plan was implemented. Twelve-month employees were furloughed seven days, and ten-month employees were furloughed five days. Employees lost an average of $1,000 each in wages, with the pay cut spread evenly across all remaining paychecks. In addition, the rate of compensation for full-time faculty teaching summer session courses was reduced. To further reduce the funding gap, $150,000 in Capital Expense Reserve Fee revenues were transferred to the operating budget.

The above expenditure reductions were insufficient for meeting the state funding cut, so the College was forced to raise revenues. This was done through the introduction of a new consolidated student fee. The origins and development of the

Instructional Services Fee (ISF) will be discussed in a later section. To sum up, the FY92 state aid reversion was accomplished as follows:

Measures to Meet FY92 State Aid Reversion	
Cost containment	$1,300,000
Employee furlough	600,000
Summer teaching pay rate reduction	250,000
Capital Expense Reserve Fund transfer	150,000
Instructional Services Fee (ISF)	1,500,00
Total	$3,800,000

The College's asking budget for fiscal year 1993 was the same as the year before, $38.4 million. Initial revenue projections indicated a likely deficit of $1.8 million. To meet this anticipated budget deficit, three strategies were implemented at the beginning of the year. A fourth strategy, elimination of programs and services, served as a contingency plan had the financial situation deteriorated further.

The first strategy was administrative reorganization. Through reallocation of responsibilities, seven administrative positions were abolished. This reduction, from 41 to 34, represented a 17 percent decrease in administrative positions. The positions eliminated were: five deans (of computer and engineering technology, educational development, humanities, science and mathematics, and physical education), and two directors (of admissions and career planning). The reorganization essentially consisted of seven cases of two divisions or offices being collapsed into one (for example, English and humanities, previously with their own dean, were combined into one division).

The reduction in instructional deans was in accord with recommendations that surfaced seven years earlier during the College's self study prepared for Middle States accreditation review. The College's study group on organization, administration, and governance, six of its ten members faculty, recommended in its 1985 report that the role and number of instructional deans be examined, asserting that "reassessment of the role of the deans may result in fewer dean positions." The Middle States visiting team, citing a perceived lack of academic leadership plus faculty "discontent with fragmentation, territoriality, and lack of cohesion," gave "unqualified support" for reducing the number of deans. However, follow-up discussions on campus, including a forceful written response from one of the deans (subsequently endorsed by several other deans), led to modest changes in responsibilities but no reduction in positions.

The second strategy implemented to meet the projected FY93 deficit was a voluntary resignation incentive program, commonly referred to as the "early out," offered to College employees with a minimum of 20 years of service. Of the 170 employees eligible, 17 or ten percent applied for the program and were approved. Ten faculty, three administrators, and four classified staff received incentive payments equal to half their annual salary in exchange for their early resignation.

The third strategy for FY93 budget planning involved cost savings through "downsizing" efforts implemented by the vice presidents in each area. Though the measures adopted varied by area, common approaches included eliminating vacant positions from the operating budget and reducing hours of operation. Seventeen full-time and ten part-time classified staff positions were abolished.

In addition to the above measures, the College entered FY93 continuing the austerity program of no professional development, no conference travel, a freeze on hiring except positions deemed essential by the President, and no salary improvements. These cost containment measures, combined with implementation of the three strategies described above, produced the following savings to meet the projected $1.8 million deficit:

Measures to Meet Projected FY93 Deficit	
Administrative reorganization	$300,000
Voluntary resignation incentive program	400,000
Area downsizing	800,000
Cost containment	300,000
Total	$1,800,000

Instructional Services Fee

The primary justification for implementing the new Instructional Services Fee, or ISF, was to generate the revenue needed to meet the FY92 budget shortfall created by the state funding reversion. A fee was chosen, as opposed to an increase in tuition, because PGCC's high tuition had become a sensitive political issue. Due to historically low levels of county support, compared to peer community colleges in Maryland, PGCC's tuition was among the highest in the state--a fact that had become a focal point of some political attacks on the College

(Clagett, 1992). Instituting a reform in the College's fee structure enabled the institution to maintain its tuition unchanged at $55 per credit hour. The ISF was also introduced as a simplification of PGCC's increasingly complex set of fees. In addition to registration and student activity fees, the College had--prior to the ISF--271 separate course laboratory fees, a capital expense reserve fee, a natatorium fee, plus three pending fees: an instructional support services fee, an instructional technology fee, and a parking fee. The ISF replaced all but the registration and student activity fees. But there was another motive behind the ISF.

In September 1984, at the request of the vice presidents of instruction and finance, the institutional research office investigated several multi-tiered, cost-based tuition schemes. The proposed differential pricing concept based student charges on the actual cost of providing instruction in different disciplines. The argument was that students pursuing more expensive programs of study should pay more than those taking less expensive courses. The additional revenue generated by students in the higher-priced disciplines would be used to fund the costs associated with them, such as computing time, supplies, and equipment. In this way, programs could be kept up to date by the tuition revenues of the students directly benefiting. Cost-based differential pricing was seen by its proponents as both fair and as not too far removed from the existing pricing scheme which included a variety of course-based laboratory fees. However, the differential tuition idea didn't go anywhere. A major concern was that higher tuition might encourage students to shift to less expensive programs, driving up unit costs in the more expensive programs even further, perhaps to the point that socially-needed programs (such as nursing and allied health) might be terminated due to perceptions of excessively high costs. Not wanting to penalize students for their curriculum choices, plus institutional reluctance to be an innovator in this area ("no one else is doing it"), stopped the idea in its tracks. It took the fiscal crisis of October 1991 to revive the idea in different clothes.

A discipline cost analysis system developed by the Maryland State Board for Community Colleges in 1973 provided the foundation for the new fee. The SBCC programs yield total cost per FTE student for teaching classes in each instructional discipline. Total costs include faculty compensation, additional direct instructional costs such as laboratory supplies, and indirect or overhead costs allocated across disciplines in proportion to their respective shares of total college enrollment. Costs are assigned to individual course sections and then summed to the discipline level. Discipline unit costs are influenced by instructional methodology factors (class size, course contact/credit hour ratios, and supply and equipment costs associated with lecture/laboratory/clinical formats) and institutional history factors, such as discipline differences in the proportional use of adjunct faculty and full-time faculty rank and salary profiles. Representative of discipline costs per FTE in FY93 at PGCC were $3,107 in remedial mathematics, $3,293 in business management, $3,625 in history, $4,508 in art, $4,893 in chemistry, $5,231 in electronics technology, $5,659 in nursing, and $7,118 in nuclear medicine.

The Instructional Services Fee implemented in Spring 1992 had three levels--$15, $20, and $25 per credit hour: less expensive lecture courses were assigned the $15 fee, limited-enrollment health technology courses were assigned the $25 fee, with laboratory courses typifying the mid-range at $20 per credit hour. The new fee structure cost a part-time student carrying seven credit hours an additional $91 to $136 per term, depending on the particular courses taken.

Instructional Services Fee (per Credit Hour)		
Level I	Level II	Level III
English	Computer/Info Sys.	Nuclear Medicine
Management	Engineering Tech.	Nursing
Math/Engineering	Languages/EFL	Radiography
Criminal Justice	Office Technologies	Respiratory Ther.
Philosophy	Physical Education	
Social sciences	Natural sciences	
Speech		
$15	$20	$25

Approximately 70 percent of the annual credit hours in FY92 were in Level I disciplines, 27 percent in Level II, and three percent in Level III. Despite the increased costs to students associated with the ISF, enrollment in health technology has increased steadily since implementation of the new fee structure.

Recruiting the Non-college-bound

The administrative reorganization and new Instructional Services Fee addressed the immediate financial emergency facing PGCC in 1992-93. A third major proposal was intended to address the longer term financial outlook. Realizing that constrained public support would continue to exert pressures for higher tuition and fees, the College was concerned about the ability of students to pay and what impact the higher charges might have on enrollment. The ISF had raised student charges to the point that for full-time students taking 15 or more credits PGCC was no longer less expensive than several campuses of the University of Maryland. Unlike the University, PGCC did not have a full-time tuition package but instead charged the per-credit hour rate regardless of the number of hours carried. Thus, while PGCC's per-hour rate was still less than the senior institutions, hours taken above 12 were "free" at the University while they added to the community college student bill at the set per-hour rate. The net result was that PGCC had lost its competitive price edge for full-time students. The old arguments aimed at full-time baccalaureate seekers, such as "come to the community college for your first two years and save money for your junior and senior year," simply were untrue. While full-time students accounted for only a fourth of PGCC's credit headcount, they generated 44 percent of the College's credit hours. Significant losses in full-time students would clearly erode the student revenue base. Finance office projections suggested that student tuition and fees would have to account for half of PGCC's budget by fiscal year 2000. At current enrollment levels, tuition/fee rates would have to more than double to meet this target. The College's administration was concerned about the impact of such increases on both enrollment levels and the institution's mission, particularly its commitment to educational access. How could the College meet its budget forecasts and constrain the rise in student tuition and fees? One answer that surfaced was to increase enrollment. Given its current average class size of less than 20 students, the College could absorb additional enrollment without incurring excessive new costs.

The College's director of recruitment had argued, for over a decade, that PGCC should more aggressively recruit County high school students who were not considering college. He was convinced, through years of working closely with the schools, that a substantial number of students could benefit from what the College had to offer. Such a recruiting strategy, if successful, promised to meet a social need, generate needed enrollment revenue, fulfill the College's access mission, and perhaps promote County economic development by expanding its productive workforce. In addition, data compiled by institutional research had documented that Prince George's County had a low college attendance rate compared to neighboring, peer jurisdictions. To advocates of this strategy, the non-college-bound constituted a natural market for the community college to serve. However, for over ten years, the arguments against this idea had prevailed. Faculty, in particular, were concerned about increasing the number of unprepared and possibly disruptive students. A shift in resources to developmental education would be needed, difficult in a time of fiscal constraint. Increased demand on instructional support services would also require additional funds. Expanding the population of students needing remediation, already a majority, was seen as harmful to the College's external image. An influx of unprepared students would probably have a negative impact on student outcomes indicators, potentially a public relations problem as accountability measures gained greater visibility. Finally, the non-college-bound segment might be expensive to market, and such recruiting efforts probably had a low probability of success. After all, by definition this group was not interested in college and thus recruiting messages would have a hard time connecting.

The budget difficulties of 1992-93 persuaded many members of the PGCC administration that a strategy to increase enrollment was necessary. The dean of enrollment management, joined by the director of institutional research, made the case in February 1993 that the only market with substantial growth potential was the currently non-college-bound. PGCC already "owned" the part-time market, enrolling the overwhelming majority of County residents attending as part-time undergraduates. The full-time, baccalaureate-seeking market was not promising due to the loss of PGCC's historical price edge, plus aggressive recruitment from senior institutions across the country. (Prince George's County, containing the nation's largest black middle class, was a prime recruiting ground for colleges seeking African-American students.) The case was made that an outreach strategy, aimed at neighborhoods and high schools with low college attendance rates, and incorporating financial aid workshops, should be considered. In addition, the research office had developed a "lifestyle cluster" geo-demographic market analysis system (*PG-TRAK©*) that could help target recruiting efforts (Boughan, 1990). A proposal to use the newly-created *PG-TRAK©* for targeting the non-college-bound in February 1990 had been rejected. Three years later, in different financial circumstances, a similar proposal was adopted. As of November 1993, plans for such a strategy are being developed.

Fiscal Crisis as Catalyst for Reform

The fiscal crisis provided both opportunity and justification for implementing ideas that had been contemplated for a number of years. The reduction in instructional administrators, introduction of a differential student fee structure based on discipline cost analysis, and aggressive marketing of the non-college-bound--all had been proposed and debated but not adopted during the good times. Concepts of merit such as cost-based differential pricing, and tools of value like geo-demographic market research, had lain dormant due either to a lack of critical mass or active resistance by key members of the college community. The severe fiscal crisis precipitated by state funding cuts of unprecedented magnitude provided the catalyst for reforms that, on balance, have been beneficial to the institution. The process of adjustment was difficult and painful. Employees suffered wage reductions and students had to pay more. But the mission of the college was preserved, even enhanced, and the quality of the teaching-learning experience maintained. Indeed, by emerging a leaner and fiscally stronger organization, the College was able to fund several new initiatives in FY94 while neighboring institutions were still struggling with cost containment programs.

Shadow Plans

The administrative reorganization, new fee structure, and targeted recruiting strategy can be characterized as components of a "shadow" plan that remained hidden from view but was available for implementation at the opportune time. Such a plan differs from the more visible public relations, bureaucratic, and action plans familiar to most planners in higher education.

The public relations plan provides legitimation and the appearance of rational management to external audiences. Attractive college publications describe integrated planning procedures adhering to established timelines, planning committees with wide representation, strategies and institutional priorities based on internal audits and environmental scans. Yet these are typically works of fiction. The reality bears little resemblance to what is portrayed in the pretty shelf documents. Individual offices go about their business often unaware of a collegewide plan, and top-level decisions are made within the president's immediate staff. The "planning process" is largely irrelevant, indulged in by top management only because of its public relations value.

In contrast, the bureaucratic plan is pervasive. Its main function is control, and individual offices are required to participate as part of the budget-building process. Specific staffing and budget requests must be tied to unit goals and objectives, which must be linked to institution-wide priorities. Rather than the few glossy pages typical of a public relations plan, the bureaucratic plan may be incorporated in a thick budget document containing detailed goals and budgets for each campus unit. While the existence of a bureaucratic plan can also serve the legitimation goals of a public relations plan, the internal dynamics are totally different. Everyone is aware of the plan, and much time and effort are devoted to it.

Despite their differences, both public relations plans and bureaucratic plans typically support the status quo. Action plans are different. To facilitate the accomplishment of a major presidential or governing board goal, such as a change in campus mission, major reorganization, substantial resource reallocation, or other fundamental change, a formal planning process may be invoked. What sets action plans apart is an awareness across the campus that real changes will result, that meaningful decisions will be made, and that the formal process at the very least provides an avenue for input. The planning process is a tool used to help move the institution in a new direction, and is usually taken seriously by the participants. Almost by definition, action plans will be infrequent, as fundamental change is a rare event.

Most observers of higher education can recognize and probably cite examples of public relations plans, bureaucratic plans, and action plans. The concept of a "shadow plan" is new. Shadow plans are not adopted formally, do not appear in planning documents, and in fact are not discussed explicitly on campus. They consist of reform ideas that have surfaced in the past but have not been enacted. A shadow plan is different from an acknowledged contingency plan. To the extent that potential challenges can be anticipated, contingency actions can be incorporated into any of the plan types. What distinguishes a shadow plan is that it remains hidden in the minds of key policymakers. Indeed, calling it a plan overstates its coherence, in that it represents a collection of ideas and reforms held individually by decisionmakers, some of whom are more aware and devoted to certain reforms than others. Typically the reforms have been discussed, debated, and seemingly discarded, in the past. Institutional inertia or outright opposition prevented them from being enacted. But key players remained committed to them, and their eventual implementation only awaited the right opportunity.

A budget crisis can be the catalyst unleashing ideas hiding in the shadows, especially if a plausible argument can be made that their implementation will have a positive fiscal impact. The three cases described above are examples, and raise several questions. Are there ideas "hiding in the shadows" of most institutions? If they have not been adopted during normal times, does it make sense to adopt them in a crisis? Should a deliberate effort be made to bring these ideas to light, to assess their impact in a non-crisis atmosphere? Do public planning procedures and documents have meaning if shadow plans exist?

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Outreach Programs and Their Varying Impact on Key Market Segments

David J. Costello, Ph.D.
Dean of Enrollment Planning
Newbury College

Abstract:

The outreach efforts of many institutions are extensive and, more importantly, expensive. With each passing year, the recruitment effort among colleges for qualified students has increased. What has not normally maintained pace with this increased effort is the management and assessment of specific outreach programs. This paper analyzes how various admission outreach programs impact key market segments (e.g., quality of applicant, housing applicant, interviewed applicant). Recruitment data from a two-year private institution indicate that outreach programs have varying impact on key institutional market segments.

Introduction:

There is a story about a customer at a bar commenting on how tasty his beer was. His friend, a rather melancholic marketing person, lamented that it was advertising, not beer, that he was drinking. In today's competitive educational marketplace, it takes a hidden talent at times to discern the real difference between the *product* of education and the *marketing* of education.

The *marketing* and the *selling* of higher education have never been more overt and intense. Outcome measures, marketing niches, segmentation analysis, revenue full-time equivalents (RFE's) -- the adoption of these terms reveals that the world of higher education is moving quickly into the marketing world of Wall Street. This new world -- one full of consultants, advertising agencies and a host of media outlets -- does not come cheaply. The underlying premise is that as the competition for students intensifies, the pressure on institutions to spend more money on advertising and marketing increases.

Willing participants in the ever-increasing competition for students quickly discover the apparent contradiction between a cost sensitive market (e.g., students) and a more expensive recruitment effort. Furthermore, it is becoming clearer that, in many instances, the *marketing of the message* is clearly muddling the true image of the product. In the long run, the increasing dissonance between students' perceptions of the marketing message and the actual product delivered needs to be fully addressed by enrollment managers. Yet, given the saturation of the marketplace with educational information, enrollment managers need to study possible ways to control both the message and the cost of its recruitment efforts.

At this institution surveys reveal that the costs of education play the most salient role in the students' enrollment decision. Despite this fact, tuition costs continue to spiral as institutions spend increasingly more money in an attempt to remain a viable enrollment option for students. For a tuition-dependent institution, the implicit assumption is that students with the ability to pay will be, in part, subsidizing their less financially-abled counterparts.

The increased tuition costs underscore the relationship between the ever-increasing revenues needed to sustain an institution and the institution's dependency on enrollments (as well as the ever-increasing dependency an institution must place on marketing to recruit prospective students). It is not the intent of this paper to argue whether or not an institution should partake in these marketing endeavors -- most institutions cannot afford *not* to participate. The intent of this paper is to show how marketing and recruitment efforts is measured in terms of effectiveness and how these measures lead to informed enrollment management/marketing decisions.

Methodology:

THE SETTING

The setting of this study is a two year institution situated in a suburban location three miles outside of a large northeastern city. With its career-orientation, the College attracts students from the New England region along with relatively healthy enrollments from students living in New York and New Jersey. A typical year will see the College attract 2,000 applications and enroll approximately 500 students. The College has a mix of commuter and resident students with approximately 35% of its students choosing to reside in on-campus housing. With rising costs and increased competition with four year institutions for traditionally two-year type students, the goal of the College is to expand its housing base while maintaining steady new enrollments.

THE SOURCES OF INQUIRY

The study explores the influence of four major sources of inquiry on the enrollment decision of 1,123 accepted freshman students. As with most institutions, the College employs a variety of techniques in order to generate prospective student interest. From planning guides and television commercials to direct mail offerings and on-campus events, the initial point of contact with the student is the primary subject of this analysis. For analytical purposes, the 80+ inquiry sources are collapsed into four mutually exclusive categories. (Listed beneath each major category are examples of specific inquiry sources that help constitute the inquiry type.)

- ➡ *Student Initiated* (walk-in, telephone, student referral, etc.);
- ➡ *Admission Outreach* (college fair, high school visits, classroom presentations, etc.);
- ➡ *General Mailings / Publications* (planning guides, print & television media, etc.); and
- ➡ *Direct Mail* (Student Search, American Student List, NRCCUA, etc.).

These inquiry types are major expenditure areas in the admission recruitment effort. More importantly, each inquiry type can be measured in terms of its recruitment impact and its cost effectiveness.

THE KEY MARKETS

It is important to understand that specific inquiry types may have a varying impact based on specific market segments. For example, one inquiry source may be quite effective in generating application activity among students interested in living in on-campus housing. This same inquiry source, however, may not be effective in recruiting a high quality applicant. It is important to understand how specific market segments respond to a particular inquiry type.

This study investigates six key market segments. They include:

- *Gender (male and female),*
- *Admission Rating (low, moderate and high),*
- *Application Type (Interview or Mail-In),*
- *Housing Status (Commuter or Resident),*
- *Application Date (Prior 1/93, 1-2/93, 3-4/93, 5-7/93 and 8-9/93),* and
- *Enrollment Status (Matriculant and Non-Matriculant).*

It should not be surprising to note that the College's marketing publications and overall admission effort are geared toward addressing these key markets.

THE ENROLLMENT PATTERN

Chart 1, on the following page, displays the numeric breakdown of each segment by their matriculation status. As noted, men had a 14% higher enrollment yield rate as compared to women. Similarly, commuter students, students who interviewed with an admission counselor on campus, and students with moderate admission ratings tended to enroll at a higher rate compared with their counterparts.

Similarly, Chart 2 details the application pattern for these students. As noted, the conversion rate is significantly higher for students applying on May 1st or later. This chart underscores the wide variations in enrollment yields based on the timing of the application. The data clearly reveal that the students deemed most desirable by the institution are ones that apply during low conversion periods.

Chart 1
Background Information by Matriculation Status

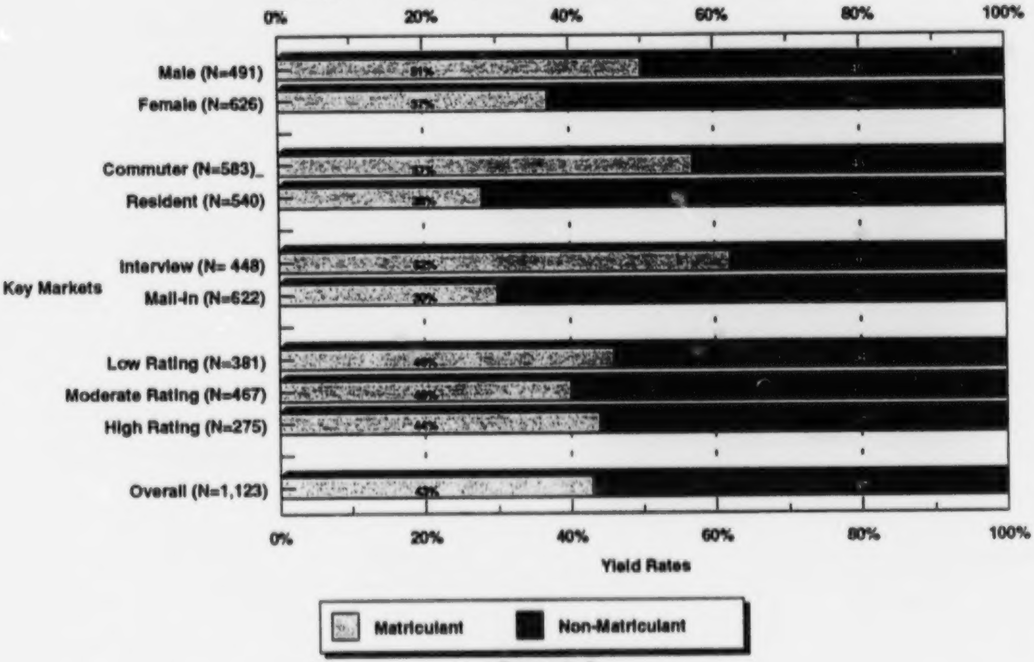
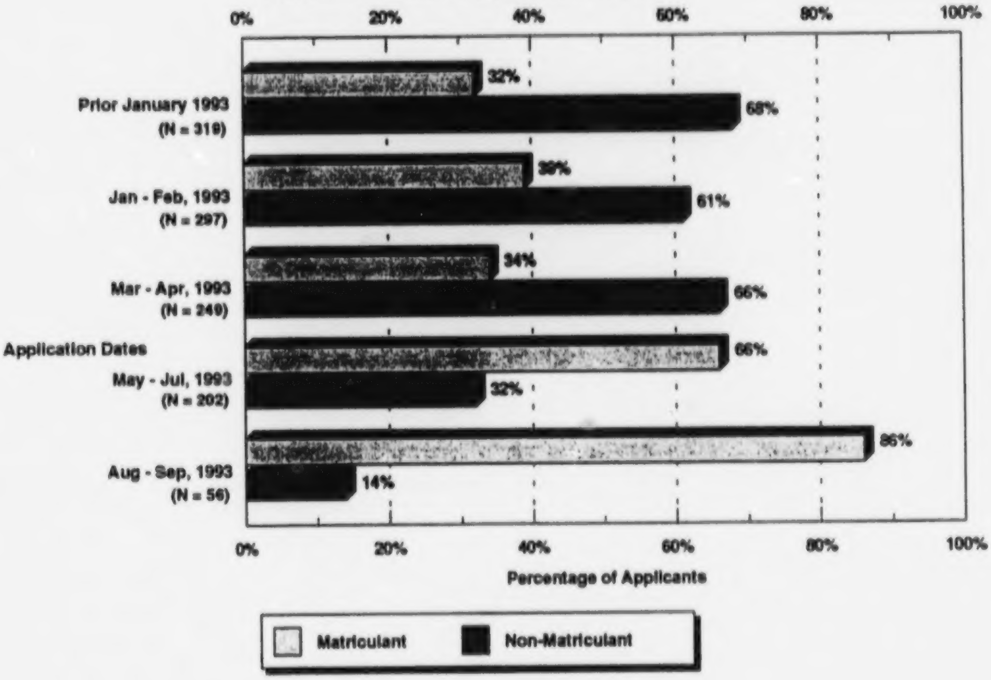


Chart 2
Application Date by Matriculation Status



THE METHOD

This study relies on a statistical technique used primarily in non-educational market settings. CHAID -- a statistical tool that utilizes a chi-square technique to automatically differentiate among different groups on a variety of nominal/ordinal data elements. The basic principle of CHAID is that it analyzes individual relationships and performs a *goodness of fit test* to determine whether or not the relationship is significant. It then looks at a hierarchy in terms of which independent variable best differentiates between a dichotomous dependent variable (e.g., matriculation status). To this end, the dependent variable in this analysis is the students' matriculation status. Four separate CHAID analyses are conducted with each analysis focusing on a specific inquiry type. Gender, housing status, admission rating, interview status, and application date are used as independent predictors of a student's matriculation status.

Data Analysis:

Chart 3 begins the process of analyzing enrollment yields by inquiry type. Clearly enrollment yields vary by as much as 20 percent depending upon the inquiry type (Student Initiated Inquiry 51%; Direct Mail Inquiry 31%). This information does imply that, all things being equal, specific inquiries can impact enrollment yields.

Chart 3

Inquiry Source by Matriculation Status

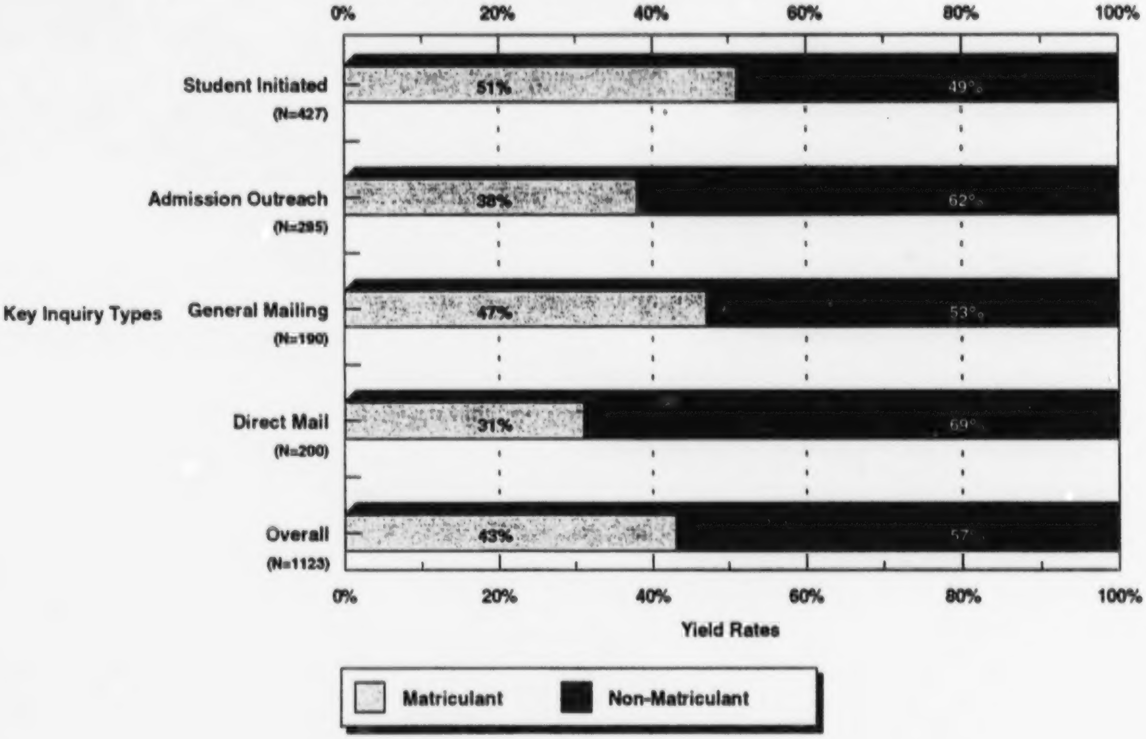
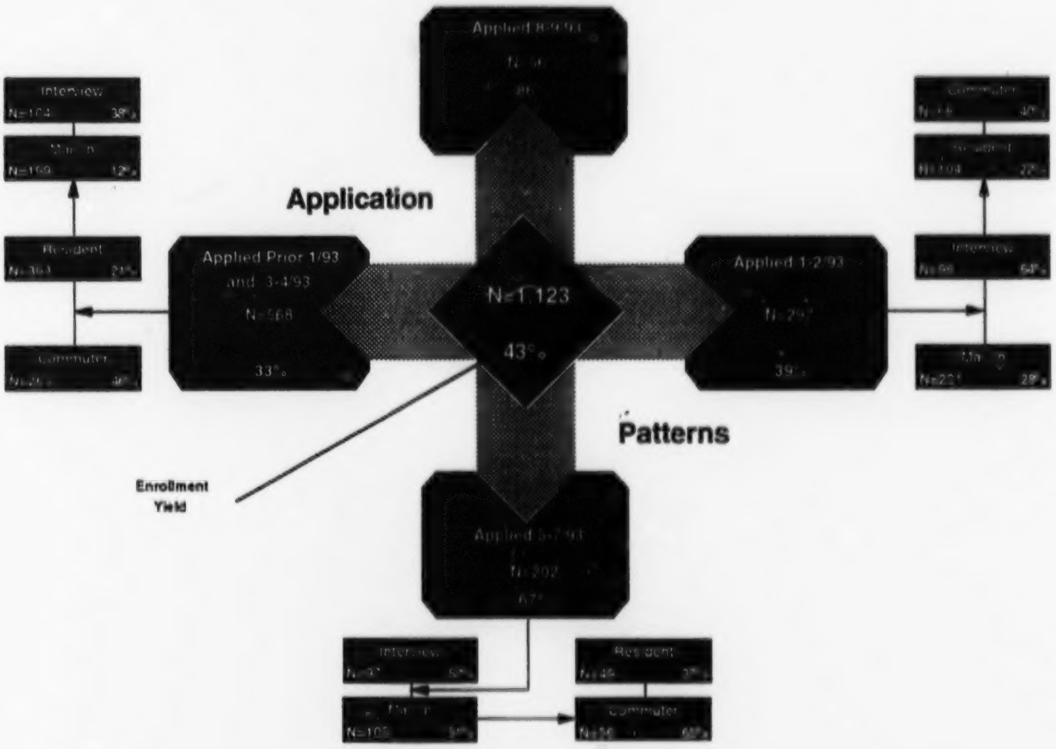


Chart 4 presents the results of the first CHAID analysis. This analysis provides insight into the independent determinants that influenced the enrollment decision. As noted, this analysis included all 1,123 accepted applicants. This chart shows that the overall accepted applicant to enrolled student yield rate is 43%. Of the five independent variables used in this study, the one that best differentiates students based on their matriculation status is the date in which they applied for admission. Of the 1,123 accepted for admission, 568 applied for admission prior to January, 1993. Among this group of students, only 33% enrolled at the College. However, when students applied between May 1st and July 30th (N=202), 67% chose to enroll at the College.

Chart 4[1]

CHAID Analysis: Factors Influencing Enrollment Yields


Applied 8-9/93
Interview
N=104 38%
N=199 12%
Application
Resident
Applied Prior 1/93
and 3-4/93
N=568
33%
Commuter
N=1,123
43%
Applied 1-2/93
N=297
39%
Interview
N=221 29%
Patterns
Enrollment
Yield
Applied 5-7/93
N=202
67%
Interview
Resident
N=49
N=105
Commuter

CHAID is a very useful tool when looking at the various paths that are created. For example, noted above was the fact that 568 students applied to the College prior to January, 1993. The data show that only 33% of these students chose to enroll. However, among these students, 265 were interested in commuting to the College. Among this subgroup of students, 46% chose to enroll. while only 21% of the students interested in living on campus enrolled. Clearly, among this large group of applicants, the College is viewed as relatively attractive by commuter students (the 46% is better than the overall rate of 43%) but less attractive to potential residence hall students. The College may need to investigate why its yield rate among this later group of applicants is low.

---

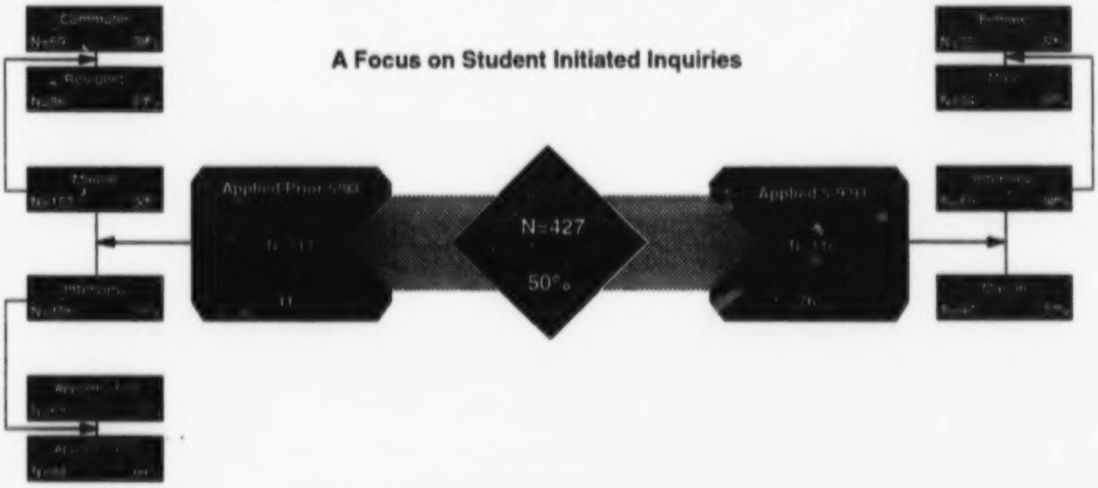
[1] **There are three aspects contained in each CHAID box. First is the name of the attribute. Second is the number of students in this category, while third is the percentage of this group that actually enrolled at the institution. For example, the top box in Chart 4 contains the application date attribute (Applied 8-9/93). Among this group of 56 students (N=56), 86% enrolled at the College (enrollment yield).**

A second path worth exploring is among students who applied for admission between May and July, 1993. As noted in Chart 4, 67% of these 202 applicants enrolled at the College. Moreover, among the students who interviewed on the campus versus mailing in their application, 83% chose to enroll. Of the 105 students who chose to mail-in their application only 51% enrolled (yet, if the mail-in applicant was a commuter student, there is a 65% s/he enrolled). Once again, this path shows that if the institution can have personal contact with the student (the interview process) the chance of that student enrolling at the College increases dramatically.

Chart 5 presents the CHAID results when focusing specifically on *Student Initiated* inquiries. As found in Chart 4, the best predictor of matriculation is the date the student applied for admission. Of the 427 accepted applicants in this category, 50% chose to enroll. Interestingly, among these students, the enrollment yields differed significantly among those who applied prior to May 1st and those who applied on May 1st or later. Of the 311 students who applied prior to May 1st, 41% enrolled. This contrasts significantly with the 116 students who applied after the May 1st date. Among this group of students 76% of them chose to enroll at the College.

Chart 5

CHAID Analysis: Factors Influencing Enrollment Yields



Following the path for 311 early applicants, the interview process comes into play. Of the 156 students who interviewed at the College, 51% enrolled (This percentage increases to 64% if the student applied between January and April, 1993). Among the 116 late applicants (applied between May and September, 1993), 69 interviewed with the

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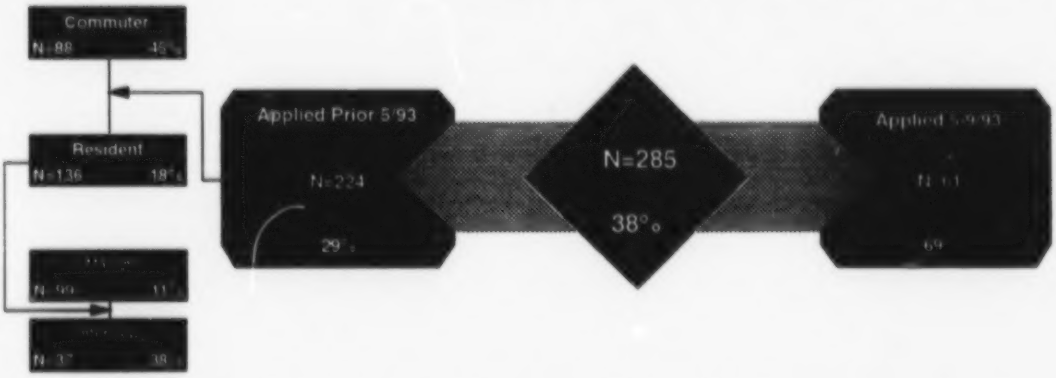
College and 88% enrolled. The enrollment yield climbs to 97% if the interviewed student was male.

Chart 6 presents the results of the CHAID analysis performed on 285 accepted applicants who inquired to the College via an admission outreach effort. As noted previously, the application date is the best determinant of a student's matriculation status. Overall, 38% of accepted applicants who were recruited directly by an admission outreach program, enrolled at the College.

Chart 6

CHAID Analysis: Factors Influencing Enrollment Yields

A Focus on Admission Outreach Inquiries



Given the fact that most admission road work is done in the fall and early spring recruitment periods, it is not surprising that the vast majority of these students inquired to the College prior to May 1st (224 students). Among these students, only 29% chose to enroll. More importantly, if the accepted applicant was interested in living on campus, the enrollment yield rate drops to 18% (136 students fall into this category). Yet, 38% of those students interested in residence hall living enrolled if they came to campus and interviewed with an admission counselor.

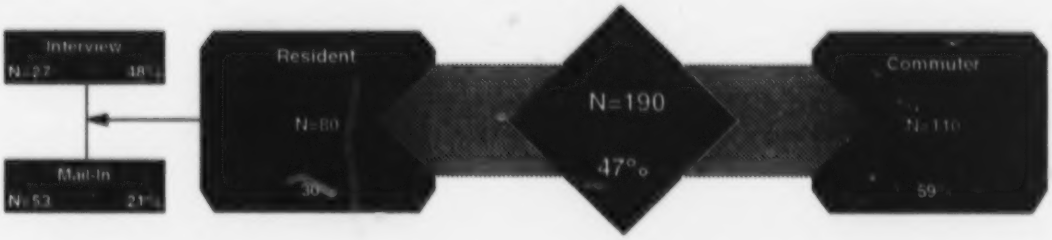
Chart 7, on the following page, details the results of a CHAID analysis performed on the 190 accepted applicants who inquired to the College via a general mailing or other non-personal medium (e.g., television, planning guides, etc.). As noted, 47% of these accepted applicants enrolled at the College.

It is the housing variable that serves to best differentiate this students' matriculation status. Of the 190 students, 110 stated that they were applying to the College as a commuter. Among this selected group of students, 59% chose to enroll. In contrast, of the 80 students who stated that they were interested in living in on-campus housing, only 30% chose to enroll. This enrollment yield rate increases to 48% if the student is interviewed on campus by an admission counselor.

Chart 7

CHAID Analysis: Factors Influencing Enrollment Yields

A Focus on General Mailing Inquiries

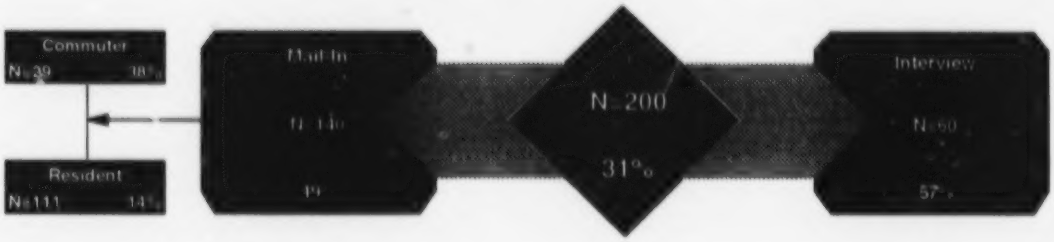

Interview
N=27
48%
Mail-In
N=53
21%
Resident
N=80
30%
N=190
47%
Commuter
N=110
59%

Lastly, Chart 8 details the findings from a CHAID analysis performed on the 200 accepted applicants who first inquired to the College via a *Direct Mail*. As noted, 31% of these students chose to enroll at the College. Of these students, 60 students interviewed at the College and 57% enrolled. Of the 140 mail-in applicants only 19% chose to enroll. Yet, if these mail-in applicants were commuter students, 38% enrolled.

Chart 8

CHAID Analysis: Factors Influencing Enrollment Yields

A Focus on Direct Mail Inquiries


Commuter
N=39
38%
Resident
N=111
14%
Mail-In
N=140
19
N=200
31%
Interview
N=60
57%

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Implications and Conclusion:

The five CHAID analyses present in this study reveal that if the initial contact is personal (Student Initiated and/or Admission Outreach) the best predictor of enrollment is the date of application. However, when the initial contact is less personal (General Mailings/Other Media and/or Direct Mail) local knowledge of the institution or personal contact are the primary ways to increase enrollments.

These findings have some significant implications. More than 50% of the College's total enrolled pool applied May 1st or later (see Chart 2 for this information). Yet, more than 25% of all its accepted applicants apply prior to January. As with most institutions, the College expends nearly 75% of its variable recruitment budget during the initial stages of the recruitment process (e.g., publications, travel, direct mail campaigns, etc., are primarily fall activities)

What is also clear, not surprisingly, is that local knowledge of the College is a large determinant in the enrollment decision. This piece of information is somewhat an ally of television and other media advertising where a broad-based exposure may have a residual effect on the student marketplace. For example, a student may make a telephone inquiry (designated in this study as a Student Initiated inquiry) based on the osmosis effect of television advertising.

Lastly, the CHAID analyses clearly showed the importance of the interview process. Based on this information, the institution needs to analyze how it encourages students to visit the campus. It needs to understand the potential blocking mechanisms that may stop an out-of-state student from visiting the campus.

In sum, based on these and other analyses the College will review how it outlays monies to specific inquiry generation. Furthermore, given that certain inquiry generators will remain (e.g., Admission Outreach), a review of both the messages being imparted and when the message is being delivered will be conducted.

Analytical Techniques for Studying Student Retention

Anne Marie Delaney
Director of Program Research, School of Education
Boston College

Introduction

The purpose of this paper is to discuss data requirements for a longitudinal retention file and to present the design and analytical techniques employed in retention studies that have produced information responsive to the questions and concerns of university administrators. Proposed enhancements to these studies to include socially relevant variables are also discussed. The three major topics addressed in this paper include:

- Data Requirements for Designing a Longitudinal Retention File,
- Logic for Developing Computer Retention Programs, and
- Techniques for Analyzing and Predicting Retention

Accurate and complete information is critically important in the design of retention programs. As Glover and Wilcox (1992) observe, the ability to diagnose student retention problems and to design effective retention strategies requires the establishment of a comprehensive multi-year student data base that incorporates both student records and student survey data.

Background

Results from previous retention research studies provide a rich resource of ideas for the development of a longitudinal retention data base. These studies have investigated the effects of various student characteristics and institutional variables on retention rates at higher education institutions. Student demographic characteristics, academic qualifications, personality traits, college housing status, student-faculty relationships and financial factors are among the major categories of variables examined (Pantages, 1978).

Findings from several of these studies document that academic and social integration contribute substantially and significantly to retention (Pascarella & Terenzini, 1983; Terenzini & Pascarella et al., 1985). In these studies, academic integration is defined by cumulative freshman year G.P.A.'s, a scale measuring perceived level of intellectual development, student perception of faculty concern for student development, and the frequency of students' out-of-class contact with faculty for some academic or course-related matter. Social integration involves the average number of hours per week spent in organized extracurricular activities and the extent and quality of students' interaction with peers (Terenzini and Pascarella et al. , 1985). Further empirical studies also show that informal student-faculty interaction is either the most or second most important single variable in integration (Terenzini & Pascarella, 1980).

Other retention researchers also emphasize the strong link between social and intellectual integration and retention. In their book entitled Increasing Student Retention, Lee Noel and associates (1985) observe that social and intellectual integration reinforce institutional commitment and enhance persistence. Academic integration appears to be somewhat more important than social integration for academically superior students. Finally, frequent contact with faculty outside the classroom appears to be one of the most important components of integration affecting persistence.

Some of the variables potentially relevant to retention, such as demographic characteristics, academic performance, housing status and financial profiles, may be stored on an administrative data base. Other data, particularly information related to social integration, may be obtained through student surveys. Examples include: Student Satisfaction with Campus Life, Student Involvement in Campus Activities, Student Leadership Roles, Student Service Activities, and Student Relationships with Faculty, Staff and Other Students. These data can then be merged with the information contained in the type of administrative data base discussed in this paper.

Data Requirements for a Longitudinal Retention File

A longitudinal retention file may need to serve many purposes, including monitoring the progress of students from entrance to completion, documenting graduation rates for classes as a whole and for subgroups within the classes, determining the time of attrition, and identifying student characteristics related to graduation and attrition. These many purposes need to be taken into account in determining the elements of the file and in planning the procedures for creating and updating the information for each entering cohort.

The following proposed list of data elements has been developed with the previously stated purposes in mind. The suggested comprehensive data base is intended to provide a basis for documenting retention and for conducting research on reasons why certain groups of students complete their education and graduate and other groups of students leave prior to graduation. Most of the data elements related to understanding the factors associated with retention were selected on the basis of findings from previous retention research studies.

Proposed Data Elements for a Longitudinal Retention File

Personal Background Information

I.D.
Name - Last, First
Birth Date
Gender
Citizenship
Racial/Ethnic Background
Family Income
Parents' Education

Admission Information

High School
Quality Ranking of High School
SAT Scores
High School Rank
Size of High School Graduating Class
Admission Rating
Entrance Status
Early Notification
Entrance College
Entrance Major
Alumni Relation
High School Achievements and Honors

Academic Semester Profile

Present Term
Present Status
Present College
Present Major
Term Credit Hours
Cumulative Credit Hours
Cumulative G.P.A.
Major Cumulative Average

Academic Summary Data

Cumulative G.P.A
Total Credits
Final Major
Degree
Final Status
Graduating Class
Date of Graduation

Financial Aid Information

Applicant Status
Family Income
Need
Parents' Contribution

Financial Aid Awards by Semester
  - External Scholarships and Grants
  - Institutional Scholarships & Grants
  - Loans
  - Work Study Awards
  - Other Work
  - Other Financial Aid

Procedural Guidelines for Creating and Maintaining a Longitudinal Retention File

A separate raw data file, containing the previously specified elements, should be created for each entering freshman class. A production schedule needs to be established and followed to create and update the files each semester over a six year period. It would be advisable to read the files each semester as a quality control measure in order to ensure that the system is working as planned.

Experience with active administrative data bases prompts the recommendation to review and assess the accuracy and completeness of the data before producing retention reports or conducting retention research. The following section outlines procedures the author established during the course of the first retention study. In the first year of producing a retention report, the author performed most of these tasks. In subsequent years, student research assistants followed these guidelines to complete the tasks. Completion of these tasks contributed significantly to producing an accurate and reliable data base for conducting retention research.

Procedures for Transforming Administrative Data into Retention Research Data Base

1. Verify the total count by selecting cases based on Present Status and Entrance College. Verify the number with administrative records.

2. Obtain a Breakdown by Final Leave Status. Evaluate results using trend data as a guide.

3. Verify Graduation Status for all listed Graduates.

4. Look for additional Graduates.

    A. Check all student with blank Final Leave Status.
    B. Check status of all non-graduates with the final transcripts.

5. Identify and Delete Duplicate Records.

    A. Run Frequencies of Social Security Number or I.D.
    B. Determine which record is accurate; delete other.

6. Identify potential missing data.

    A. Verify completeness of academic information for Graduates. Compare existing semester academic information with number of semesters graduates would be expected to attend.

    B. Check other key variables - Present Status and Present College.

Once the longitudinal raw data file is complete, programs, possibly using SPSS, might be written to analyze the data. The logic of sample programs is outlined in the following section.

Logic for Developing Computer Retention Programs

This section presents the logic used, with SPSS, to create computed variables from existing data in the retention research data base. These computed variables are relevant to tracking students from entrance to graduation or departure and to tracking students within the same university, from one undergraduate school to another. The programs identify which students entered and persisted in the same school and which students changed schools after entrance; the final semester both for graduates and non-graduates; and the final leave statuses by Entrance and Final Schools. This information derived from these programs provide comparative data for evaluating variations in persistence rates within the same school and overall college graduation rates by undergraduate schools. The following section provides an overview of the logic for the computer programs. More detailed information could be obtained from the author.

Program Logic for Documenting Graduation Rates by Entrance and Final Schools

The following information outlines the major variables computed and the sequence followed in computing these variables to produce graduation rates by students' Entrance and Final School. The program monitors progress over six years, from the first through the eighteenth semester.

Computed Variables

First School (FIRSTSC)
First Semester (FIRSTSEM)

School Change(SCCHANGE) - indicates if a student transferred within the university

Last School (LASTSC)
Last Semester (LASTSEM)

```
Use 'Do Repeat' to determine Last School and Last Semester
    A= Schools from Present College(PC1) to Present College
                                                  (PC18)
    B=Count 1 to 18
```

Last School Graduation Status (LSCSTAT)

```
    IF (LASTSC EQ ' 01' AND CLS EQ ' G ')LSCSTAT=1
    IF (LASTSC EQ ' 01' AND CLS NE ' G ')LSCSTAT=2
```

These statements provide a breakdown of Graduates and Non-Graduates for College ' 01 '.

Run: Crosstabs: PC1 by LSCSTAT to produce Graduation rates by Entrance and Final Schools.

Program for Documenting Specific Final Leave Statuses by Entrance and Final Schools

The second retention program provides more detailed information with specific final leave statuses by students' Entrance and Final Schools. The two variables used in this program are: Final Leave Status (CLS) and First and Last School (FIRLASSC). The former variable, CLS, is in the original data base. The Final Leave Statuses include Graduate, Leave of Absence, Mandatory Withdrawal, and Voluntary Withdrawal. The latter variable, FIRLASSC, is a computed variable. Guidelines for computing this variable follow:

> Compute one variable (FIRLASSC) to include all possible combinations of Entrance and Final Schools. Sample statements to compute categories for this variable, with four undergraduate schools, follow:

```
IF (PC1 EQ ' 01' AND LASTSC EQ ' 01' ) FIRLASSC=1

IF (PC1 EQ ' 08' AND LASTSC EQ ' 09' ) FIRLASSC=16
```

> Run: Crosstabs: CLS by FIRLASSC to produce Final Leave Statuses by Entrance and Final Schools.

Program for Documenting Final Semester by Final Leave Status

The third retention program identifies the final semester for graduates and non-graduates, broken down by final leave status such as Voluntary Withdrawal, Leave of Absence, Mandatory Withdrawal. This information is very important in determining when students graduate and when non-graduates decide to leave the college. The two variables used in this program are Final Leave Status (CLS) which is in the original data base and Last Semester (LASTSEM) which is a computed variable. The information is produced by running a Crosstabs Program: LASTSEM by CLS.

Techniques for Analyzing and Predicting Retention

As noted earlier, the proposed longitudinal retention file, with the original and computed variables, is intended to serve as a basis for documenting retention rates, monitoring students' progress from entrance to graduation or departure, and identifying student characteristics related to variation in graduation rates.

Initially, bivariate analyses might be used to determine which variables appear to be significantly related to retention; these variables might then be included as predictors or independent variables in multivariate procedures designed to predict retention as the outcome or dependent variable. An appropriate technique for predicting retention is Discriminant Analysis - a regression approach with a dichotomous variable as the dependent variable.

In a recently completed longitudinal retention study, the following variables were included as independent variables in a discriminant analysis of retention among one major cohort of students: Freshman Cumulative Average, Resident Status, Admission Rating, High School Rank, and SAT Scores. Results from this Discriminant Analysis are presented in Table 1.

TABLE 1

DISCRIMINANT ANALYSIS: PREDICTING STUDENT RETENTION

Measures	Structure Coefficients
Freshman Cumulative Average	.92
Resident Status (2 = Resident; 1 = Commuter)	.30
Admission Rating (1 = High; 10 = Low)	-.27
High School Rank	-.25
SAT Verbal Score	-.02
SAT Math Score	.08

Classification Results

			Predicted Group Membership	
	N	Centroids	Graduates	Non-Graduates
Graduates	6321	.11	6287 (99.5 %)	34 (0.5 %)
Non-Graduates	874	-.81	755 (86.4 %)	119 (13.6 %)

Percent of Cases Correctly Classified: 89.03 %

Results From Function Test

$R_{can} = .28$ $X^2 = 542.21$ df = 5 $p \leq .001$

As shown in Table 1, the Freshman Cumulative Average correlates very strongly, .92, with the function predicting students' graduation. Though to a substantially lesser degree, Resident Status, Admission Rating, and High School Rank also correlate positively. The remaining correlations for the variables included in the function are very small - negative for the SAT Verbal Score and positive for the SAT Math Score. Overall, the model accurately predicts 89 percent of the cases. The high correlation among the existing variables is a limitation associated with this analysis.

While it is of interest to observe that freshman cumulative average is the strongest predictor of retention, it is perhaps even more critical to determine what factors are likely to predict freshman academic performance. This information may serve to identify students at risk of dropping out prior to graduation. Further, data from this retention study show that the majority of students leave either at the end of the first or second year of college.

In the longitudinal retention study reported in this paper, regression analyses were conducted to identify predictors of freshman cumulative average. In presenting these results, it is important to point out that the selection of independent variables was limited by the available data. The author believes that greater insight into the causes of attrition could be gained with the inclusion of more variables, particularly those related to social integration.

Results from multiple regression predicting freshman cumulative average from a set of admission predictors are presented in Table 2.

TABLE 2

REGRESSION RESULTS: PREDICTING STUDENTS' FRESHMAN CUMULATIVE AVERAGE FROM ADMISSION CRITERIA

Order of Entry	Predictor	Bivariate r	Multiple r	R Square	R^2 Change	Beta Coefficient	F Ratio
1.	Admission Rating	-.49	.49	.24	.24	-.34	366.09 ***
2.	SAT Verbal Score	.31	.50	.25	.01	.12	89.41***
3.	High School Rank	-.39	.51	.26	.01	-.08	26.36***
4.	SAT Math Score	.28	.51	.26	.00	.07	23.10***
5.	Gender	.10	.51	.26	.00	.04	12.06***

The F ratio for the equation is 455.79***

*** $p \leq .001$

As shown in Table 2, the Admission Rating explains 24 percent of the variance in these students' freshman academic performance. With this variable in the equation, the SAT Score and High School Rank each explain an additional 1 percent of the variance. As noted previously, since the independent variables are highly correlated, once the first variable is in the equation, the other variables can contribute little to explaining the shared variance. The amount of unexplained variance suggests the need for additional independent variables. As discussed earlier in this paper, it may be very useful to expand the data base to include more data concerning students' psychological adjustment and social integration during their early college experience. Interviews with selected students suggest that the social-psychological dimension may be the most critical in determining whether or not at risk students persist to graduation.

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Designing Alumni Research for Assessment and Planning

Anne Marie Delaney
Director of Program Research, School of Education
Boston College

Introduction

In recent years, the role of alumni research has assumed particular significance given the increased emphasis on outcomes assessment (Pike, 1990). Further, as Williford and Moden (1989) observe, a unique feature of alumni surveys, compared with surveys of enrolled students, is the capability of documenting students' assessment of the quality of their educational experience tempered by their experiences since graduation. Results from alumni research also provide a basis for examining the relationship between satisfaction with college and academic major (Richardson, 1993), perception of learning during college (Pike, 1993), and subsequent work experience (Pike, 1993a).

The purpose of this paper is to present the design, implementation strategies, analytical techniques and significant results from a recently completed undergraduate alumni study administered to the 1987 to 1991 graduating classes from the Boston College School of Education. While much of the content of the original study addressed issues related to teacher education and human development programs, the paper will show how the methodology can be applied to different academic disciplines and professional schools. The paper will demonstrate how alumni research can be designed and utilized to meet various institutional research purposes including Assessment, Program Evaluation, and Program Planning.

Design Considerations

The population surveyed in this alumni survey included five graduating classes - from 1987 through 1991 yielding a total of 800 alumni. This population provided an opportunity to document trends in the relationships between post-graduate experience and perception of the value of the undergraduate education and satisfaction with undergraduate education, and to relate changes in graduates' feedback to changes made in the curriculum during this time period.

Population

The issue of size is critical to the ability to analyze variations in the data and to make inferences to the population. Statistical formulae, taking into account levels of statistical significance and power, may be used to determine sufficient sample sizes to support tests of significance and inferences to the population.

It is also advisable to determine, prior to conducting the study, what subgroup analyses will be conducted, and to estimate not only the overall response rate but also the response rates for individual classes for which inferences might be made. In this study, the overall response rate was 58.76 percent and the response rates for individual academic programs ranged from 52 to 62 percent.

Survey Instrument

The survey instrument in this alumni study was, in part, the product of a faculty committee. My involvement occurred after most of the questions had been determined. Therefore, my role focused primarily on refining the questions and designing the questionnaire format. In this presentation, I will address general principles that ought to be considered in the design of alumni surveys, and, where appropriate, utilize this alumni survey for illustrative purposes.

The following outline and questions may serve as a useful guide in the development of alumni survey instruments .

1. What goals, components, or characteristics of the program do you want to evaluate?

	Quality of Academic Life
Goals:	Review Mission Statements, Policy Statements, and College Catalogues
Components:	Professors - Teaching, Advising Classes - Content and Degree of Challenge Class Discussions - Value Assignments - Relevance and Challenge Internships - Quality of Experience and Supervision
Program Characteristics:	Balance of Theory and Practice Up-to-Date Approaches

	Quality of Student Life
Intellectual Milieu:	Intellectual environment of the campus
Cultural Life:	Cultural opportunities available to students
Social Opportunities:	Opportunities for meaningful relationships & activities

2. What information would be relevant regarding post-graduate employment?

Employment Seeking Experience: Time, Challenge, Positions Sought, Efforts

Types of Positions Held: Titles and Length of Time

Challenges Encountered

Strategies Employed to Deal with Challenges

Challenges for which They Could Have Been Better Prepared

3. What information about respondents would be potentially relevant to analyzing variation in their evaluation of their education and their post-graduate employment experience?

Undergraduate Profile:

Academic - Hours of Study, Investment in Learning, Grades, Honors

Internship Experiences - Quality and Relevance

Student Life - Leadership Roles and Involvement in Activities

Personal Commitment - Family and Work

Post-Graduate

Graduate School - Institution, Major, Degree and Year of Completion

Affiliation with the Institution since Graduation

Employers - Obtain names of first job and current employers

Boston College School of Education Alumni Survey

This survey covered three major areas: Graduates' Evaluation of their Undergraduate Program, Graduates' Post-Graduate Educational and Employment Experience, and Selected Background Information. The following outline indicates the principal components in each of these areas:

Evaluation of their Undergraduate Program

What was their *primary expectation?*

How *challenging* were aspects of their undergraduate education - classes and field experiences?

How *satisfied* were they with each of the following: practica, supervision, classes, and university resources?

How much did their education contribute to their *growth* in different areas: communication, critical thinking, multi-cultural awareness and value awareness?

Boston College School of Education Alumni Survey (continued)

Post-Graduate Employment

Employment Seeking Experience:	What kind of job were they seeking? How difficult was it to find employment? Were they unemployed after graduation and for how long? Were they willing to relocate for employment?
Employment Experience:	Types of Positions Held Since Graduation Professional Challenges Encountered
	Examples for Teaching follow: Developing a Rapport with Students Evaluating Students' Performance Evaluating Own Teaching Mainstreaming Maintaining Discipline Motivating Students Planning Class Instruction Relating to Administrators Relating to Students' Parents Teaching Students of Different Ability Levels in the Same Class Teaching Students from Different Socio-Economic Backgrounds
	Problems that Might Have Been Better Addressed

Background Information

Undergraduate Profile:	Commuter vs. Resident Status Regular vs. Transfer Status Undergraduate Major Year of Graduation
Post-Graduate Profile	Further Education Annual Income

Implementation Strategies

With some modifications, implementation strategies for this survey generally followed the procedures outlined in Dillman's (1978) book, Mail and Telephone Surveys. Data collection efforts included a reminder post-card sent one week after the initial mailing and two subsequent follow-up mailings that included the complete survey package. A cover letter from the Dean of the School of Education was sent with each of the complete survey mailings. This letter stressed the significance of the project to the School, the importance of each respondent's contribution, an assurance of confidentiality, an offer of results and a contact for questions. While assuring confidentiality, the surveys included an I.D. ; this was essential for monitoring returns. It also provides a means of merging the survey data with information from administrative files.

Presentation of Results: Administrative Reports and Research Possibilities

Administrative Report

Results from this Alumni Survey were initially presented to the Dean in a comprehensive report of the overall survey results. The contents of the report included a comprehensive analysis of alumni responses broken down by year of graduation and by School of Education major. Graduates' evaluation of their undergraduate education related to a number of dimensions including their perception of the degree of challenge offered by their courses and field experiences; their level of satisfaction with courses, student teaching, supervision and university resources; and their assessment of the degree to which their undergraduate education contributed to their professional growth in developing various personal and intellectual skills such as self-understanding and critical thinking.

The Boston College School of Education Alumni Survey Report also provided an extensive employment profile documenting current employment status, satisfaction with current employment, geographic region of current employment and approximate net personal income last year. Information on graduates' employment seeking experience was also presented including the kinds of employment sought; difficulty in finding employment; willingness to relocate for employment and a history of employment since graduation.

The most extensive portion of the employment profile focused on graduates' professional teaching experience. This section included graduates' evaluation of their teacher preparation program by major; types of teaching positions held; subject areas in which graduates were certified to teach and had taught; number of graduates who had taught in their area of certification; graduates' perception of work related problems in teaching and their recommendations for addressing these problems in the undergraduate curricula. Graduates' non-teaching employment experience was also documented including the reasons why graduates are not in a teaching position.

In addition to the overall results, comparative data were also presented by Academic Program. This was particularly helpful in evaluating graduates' feedback on their professional teaching experience and their evaluation of their undergraduate curriculum. When asked to identify problems that should have been better addressed in their undergraduate curriculum, graduates as a whole most frequently mentioned Teaching Students of Different Ability Levels followed by Maintaining Discipline and Relating to Parents. However, as illustrated in Table 1, graduates from different undergraduate majors varied to some extent in the ranking of these problems. Special Education majors were quite different from the group as a whole; they most frequently mentioned Relating to Parents, followed by Teaching Students of Different Ability Levels, Relating to Administrators and Teaching Students of Different Socioeconomic Backgrounds as problems in need of greater attention in the curriculum. Secondary Education majors most frequently cited Maintaining Discipline followed by Teaching Students of Different Ability Levels and Motivating Students.

Table 1
Ranking of Problems Graduates Identified that Should Be Better Addressed in their Undergraduate Curriculum

	School of Education Major						
Problem	Early. Ed.	Elem. Ed.	Sec. Ed.	Special Ed.	Human Dev.	Middle School	Total
Teaching Students of Diff. Ability Levels	1 (26)	1 (73)	2 (14)	2 (24)	2 (10)	1 (4)	1 (128)
Maintaining Discipline	2 (25)	3 (59)	1 (21)	8 (13)	1 (11)	3 (2)	2 (117)
Relating to Parents	3 (23)	2 (65)	4.5 (9)	1 (25)	4 (6)	3 (2)	3 (111)
Evaluating Students Performance	5 (16)	4 (49)	10 (3)	9.5 (12)	5.5 (5)	7 (1)	4 (74)
Teaching Students from Diff. SES Background	4 (17)	8 (27)	4.5 (9)	3.5 (16)	8 (3)	7 (1)	5 (61)
Mainstreaming	7 (11)	5 (33)	8 (6)	5.5 (15)	3 (7)	3 (2)	6 (60)
Planning Class Instruction	6 (14)	6 (29)	6 (7)	5.5 (15)	8 (3)	7 (1)	7 (53)
Motivating Students	10 (7)	8 (27)	3 (12)	9.5 (12)	10 (2)	7 (1)	8 (51)
Relating to Administrators	8.5 (10)	8 (27)	8 (6)	3.5 (16)	8 (3)	7 (1)	9 (50)
Evaluating Own Teaching	8.5 (10)	10 (26)	8 (6)	7 (14)	5.5 (5)	-	10 (49)
Developing Rapport with Students	11 (2)	11 (7)	11 (2)	11 (4)	-	-	11 (12)

Faculty Presentation

Following the submission of the initial administrative report, results were presented to the faculty. This presentation highlighted strengths and areas in need of improvement for the School as a whole with some mention of differences by Academic Program. The quantitative results were presented primarily by means of graphs. The very favorable response received from the faculty may be related to the accessibility of the graphic presentation and to the deliberate focus on program strengths and to the presentation of areas in need of improvement as constructive possibilities for program enhancements.

Academic Program Reports

Subsequent to the faculty presentation, individual survey reports were prepared for each Program Chairperson. These reports contained the responses of alumni who graduated from the specific Academic Program. Program Chairpersons were encouraged to review these data and share them with their faculty in ongoing curricula review and revision.

Determinant of Successful Utilization

Administrative vision and leadership, combined with a strong commitment to planning based on research, are essential determinants of utilization of program research. The Boston College School of Education Alumni Survey benefited from the presence of this spirit and commitment in the support of the Dean of the School of Education and, with her leadership, the support of the Chairpersons and Faculty.

Other Analyses: Ideas for Further Research

Chi Square and correlational analyses were conducted to examine the relationship between satisfaction with employment, level of income and graduates' evaluation of their undergraduate education as a preparation for their career. Bivariate analyses also examined the relationship between employment satisfaction and perceived growth achieved through undergraduate education. As shown in Table 2, statistically significant relationships were found between employment satisfaction and graduates' evaluation of the preparation they received for their careers.

Table 2

Relationship of Alumni Employment Satisfaction to
Graduates' Evaluation of Their Undergraduate Preparation

A. Teacher Education Alumni Satisfaction with Employment

Evaluation of Undergraduate Preparation	Low	Moderate	High	Very High	Total N
Poor to Fair	42.9	28.8	22.2	20.4	74
Well	32.1	49.2	52.8	35.2	126
Very Well	25.0 %	22.0%	25.0 %	44.4 %	101
Total	100.0% (28)	100.0% (59)	100.0% (72)	100.0% (142)	N=301

X^2=19.8 (p < .01)

B. Non-Teacher Education Alumni Satisfaction with Employment

Was Program Helpful?	Low	Moderate	High	Very High	Total N
No	57.1 %	27.0 %	12.2 %	14.3 %	33
Yes	42.9	73.0	87.8	85.7	129
Total	100.0 % (14)	100.0 % (37)	100.0 % (41)	100.0 % (70)	(N=162)

X^2=16.0 (p < .01)

As illustrated in Table 2, among Teacher Education graduates, 44 percent of those who express 'Very High' satisfaction with their employment, compared with only 25 percent of those who express 'Low' satisfaction with their employment, report that their undergraduate education prepared them 'Very Well' for their career. Similarly, among graduates of Non-Teacher Education programs, 86 percent of those who express 'Very High' satisfaction, compared with 43 percent of those who express 'Low' employment satisfaction, report that their undergraduate program was helpful in preparing them for their present employment.

Among the various areas of perceived growth examined - Communication Skills, Critical Thinking, Multicultural Awareness, and Problem Solving - results revealed one statistically significant relationship between Employment Satisfaction and growth in Communication Skills. Some 50 percent of those who report 'Very High' employment satisfaction, compared with 29 percent of those who report 'Low' employment satisfaction, report their Communication Skills grew 'Very Much' through their undergraduate education.

Discussion of Noteworthy Findings

Results from this alumni survey yielded both quantitative and qualitative data. At the conclusion of the survey, respondents were invited to share their perspectives regarding what aspects of their undergraduate program they found most helpful and what aspects might be improved or strengthened for future students. Four major themes emerged from analyses of these qualitative comments: Recommended Changes in the Curriculum, Expansion of the Internship Experience, Increased Career Advising, and More Integration of the Human Development Major in the School of Education. The ideas offered in the qualitative comments were generally consistent with results from the quantitative data. Highlights from these findings follow.

Over eighty percent of the graduates expressed satisfaction with their undergraduate education. At the same time, there was variation in the perceived level of challenge in certain courses. Comparative data indicated the need for increased challenge in certain courses.

Perhaps reflecting the influence of their experience since graduation, alumni strongly advocated more application of theory to practice during undergraduate education.

Consistent with the emphasis on practice, alumni applauded the early teaching experience afforded through a sophomore year pre-practicum and advocated expanding both the time and the level of responsibility associated with existing practicum experiences.

With a focus on the relationship between education and employment, alumni also strongly recommended early, realistic and more intensive career advising for all undergraduates.

Finally, while results from this survey documented some themes common to all alumni, the data also revealed variations by academic program in terms of perceived need for changes in the curriculum, experience in finding employment, and professional challenges encountered in graduates' early careers. This program specific information is currently being utilized in ongoing program evaluation and curriculum development at departmental levels throughout the School of Education.

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Beyond E-mail:
Getting Data from the Internet

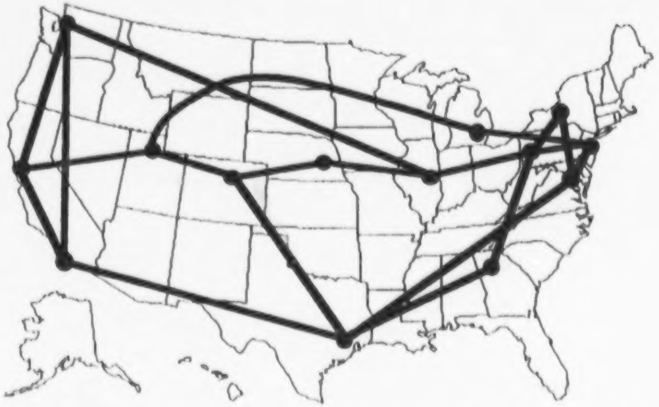
NEAIR
20th Annual Conference
The Sagamore

presented by:
Jim Fergerson
Dir. of Institutional Research
Bates College
Lewiston, ME 04240

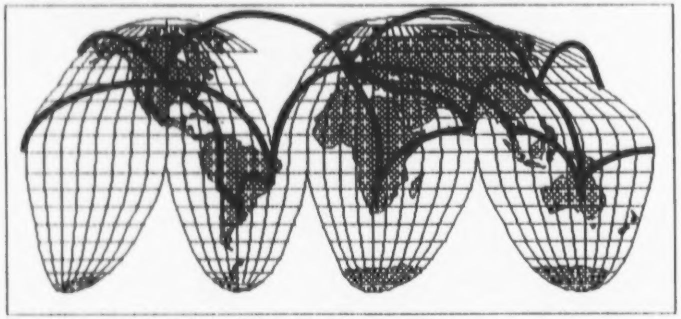
Beyond E-mail: Getting Data from the Internet

Jim Fergerson
Director of Institutional Research
Bates College, Lewiston, ME 04240
jfergers@abacus.bates.edu
702 786-8210

- I. **What is the Internet?**
  - A. an outgrowth of the defense-related ARPAnet
  - B. National NSFnet Backbone



  - C. Several regional systems provide service to individual campuses
    - 1. NEARnet, NYSERnet, etc.
  - D. Global Internet



  - E. Transfer rates: 56,000 bps to 45 million bps

- II. **How do I get to the Internet?**
  - A. Direct connection to personal computer (TCP/IP, Ethernet)
  - B. Serial connection (dial-in through mainframe)
  - C. Dial in through commercial services
  - D. Internet access for BITNET users
    - 1. Discussion groups
    - 2. Electronic mail gateways
    - 3. Mail servers allow limited file transfers or database queries
- III. **Internet Addresses**
  - IP (Internet Protocol) Address
  - A. Numeric (similar to a "phone number")
  - B. 150.209.100.22 = jfergers@abacus.bates.edu
  - Domain name system
    - username@machine.institution.edu
    - jfergers@abacus.bates.edu
  - Domain name conventions

.edu	educational institution
.com	commercial enterprise
.gov	government organization
.mil	military
.org	organzation

International: .ca (Canada), .uk (U.K.), .fr (France), etc.

- IV. **Expanding e-mail's usefulness**
  - A. Carbon copies and forwarding
  - B. Setting up "alias" distribution lists to manage work groups
  - C. Sharing non-text files (attachments/enclosures)
  - D. A very low-cost "fax" alternative
  - E. E-mail directories or notebooks as a file system
  - F. Calendar reminder (mail to yourself)
- V. **E-mail discussion groups**
  - A. Basic LISTSERV Commands

Important: Send commands to the LISTSERV, NOT to the Discussion Group!

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VMS/JNET:	SEND LISTSERV@(LOCATION) "(Commands)"

GET LIST GLOBAL	Get a LARGE list of all lists
INDEX listname	list of files available via LISTSERV
GET Filename Filetype	get a file from a LISTSERV
REVIEW listname	get subscribers names, addresses
SUBSCRIBE listname yourname	subscribe to the list
SIGNOFF listname	get off the list
SET listname NOMAIL	temporarily suspend mail
SET listname MAIL	start receiving messages again

- I. Electronic Mail and Discussion lists
  - A. Lists of Discussion Groups

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Beyond E-mail: Getting Data from the Internet

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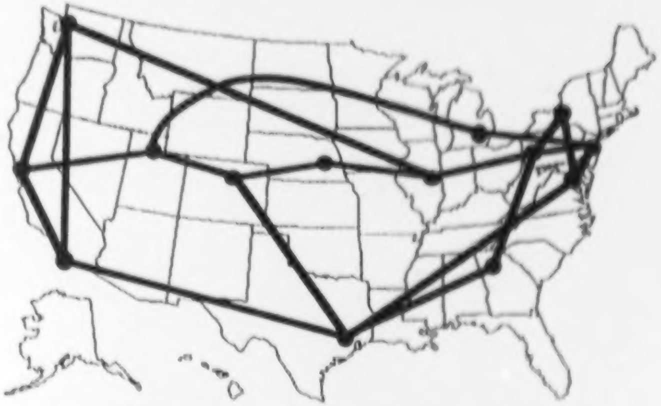

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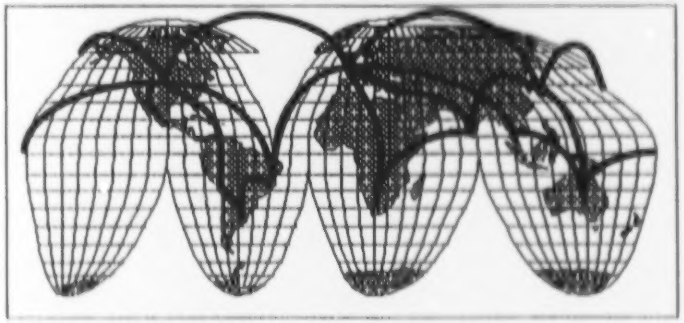

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   A. Carbon copies and forwarding
   B. Setting up "alias" distribution lists to manage work groups
   C. Sharing non-text files (attachments/enclosures)
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VMS/JNET:	SEND LISTSERV@(LOCATION) "(Commands)"

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GET Filename Filetype	get a file from a LISTSERV
REVIEW listname	get subscribers names, addresses
SUBSCRIBE listname yourname	subscribe to the list
SIGNOFF listname	get off the list
SET listname NOMAIL	temporarily suspend mail
SET listname MAIL	start receiving messages again

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   A. Lists of Discussion Groups

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EFF The Electronic Frontier Foundation, Inc., 20
CNI Coalition for Networked Information, 20
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Where to find or test some recommended Internet tools 20
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1. email: Listserv@ndsuvm1
    a) message: (no subject) GET INTEREST PACKAGE
2. ftp: nisc sri com   get /netinfo/interest-groups

B. Netiquette
1. Send subscription commands to the LISTSERV!
2. Reply to the sender, not to the group
3. Summarize responses to your queries
4. Provide context for your readers (quoting)
5. Don't abuse cross posting
6. Avoid "flame" wars
7. Signoff or suspend discussion group mail when away

C. Some Lists of interest to Institutional Researchers

AAUA-L@UBVM	American Assoc. of Univ. Administrators
AAUREG@PUCC	AAU Registrar's List
AIR-L@UNMVM	AIR BITNET Newsletter
ASHE-L@UMCVMB	Assoc. for the Study of Higher Education
ASSESS@UKCC	Assessment in Higher Education
CAIRNNET	California Assoc. for Inst. Research
CUMREC-L@NDSUVM1	Admin. Computers User's Group
CWIS-L@WUVMD	Campus-Wide Information Systems
DASIG@SUVM	Data Admin. Special Interest Group
EDAD-L	Educational Admin. Discussion List
EDI-L@UCCVMA	Electronic Data Interchange Issues
EDPOLYAN@ASUACAD	Prof. & Students discussing Ed. Planning
EISSIG@ASUACAD	Exec. Info. Systems Special Interest Group
HEPROC-L@AMERICAN.EDU	Higher Education Processes Conference Hall
IAN	Intercollegiate Athletics Newsletter
NACUBO@BITNIC	NACUBO Col. and Univ. Business Officers
SCUPMA-L@AUVM	Mid-Atlantic SCUP Newsletter
SCUPNEWS@UCBCMSA	SCUP BITNET Newsletter
SPEEDE-L@VTVM1	AACRAO electronic transcript discussion
STLHE-L@UNBVM1	Teaching & Learning in Higher Educ.
TQM-L@UKANVM	Total Quality Management list

Some lists may not be subscribed to using LISTSERV commands. An e-mail request to the list coordinator (a real person) may be necessary to get access to the list.

GET NETWORK GUIDE from LISTSERV@UNMVMA.BITNET gets a list of instructions for mailing between the various national and international computer networks.

DO NOT SEND SUBSCRIPTION REQUESTS TO THE LIST MAILING ADDRESS. (Everyone on the list will get the request. Send requests to the LISTSERV or to the list coordinator.)

VI. **Telnet (Remote Login)**
- Telnet allows guests limited login access
- TN3270 needed for certain IBM mainframes
- Allows direct access to databases
- Connect to on-line library catalogs (OPACS)
- File transfer

Sample Telnet session

I. Connecting

```
abacus >telnet        <-invoke telnet from local system
telnet> open access.usask.ca    <--open domain name
Trying...
Connected to access.usask.ca.   <--connection success!
Escape character is '^]'.     <--"caret-bracket" is best way to break
out; otherwise, try quit, bye, or Control-D

Ultrix UNIX (access.usask.ca)    <--host system prompt

login: hytelnet       <--host asks for login id or password
Last login: Tue Jun 16 08:02:23 from 150.209.100.17
ULTRIX V4.2 (Rev. 96) System #3: Mon Mar  9 11:04:14 CST 1992
UWS V4.2 (Rev. 272)

    Welcome to Access, running Ultrix 4.2

<<<we made it into online HYTELNET!  Menu displayed:>>>
```

II. Menu

```
                    Welcome to HYTELNET  version 6.4
                    ................................

             Up/Down arrows move    Left/Right arrows select

                      What is HYTELNET?   <WHATIS>
                       Library catalogs   <SITES1>
                        Other resources   <SITES2>
                 Help files for catalogs  <OP000>
                       Internet Glossary  <GLOSSARY>
              Online Catalog interfaces   <SYS000>
                            Telnet tips   <TELNET>
                    Key-stroke commands   <HELP>

<<<select appropriate menus>>>
```

VII. **FTP (File Transfer Protocol)**
- A. FTP allows file transfers to and from remote machines
- B. Password or anonymous access
    1. "Anonymous FTP" lets users transfer software to/from machines where they don't have accounts
- C. File Transfer
    1. Binary (Image) vs Text downloads
    2. FTP commands
- D. File conversion
    1. BinHex/UUencoding
    2. Compression
- E. Getting files from your mainframe to your personal computer
    1. Terminal software
- F. Some warnings and advice
    1. Downloaded software could contain viruses
    2. Your user account may not be entirely private or secure
    3. Schedule your network use for non-peak hours

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- G. Public domain software archives (anonymous ftp or BITFTP)
  - 1. Macintosh archives
    - a) ftp: sumex-aim.stanford.edu directory: info-mac
    - b) ftp: ftp.cso.uiuc.edu
    - c) e-mail: LISTSERV@RICEVM1.RICE.EDU
    - d) message: (no subject) $MAC commands
      - (1) $MAC INDEX ALL, $MAC GET filename
      - (2) 300K limit
  - 2. MS-DOS archives
    - a) ftp: wsmr-simtel20.army.mil (the MAIN MS-Dos archive)
    - b) ftp: hydra.uwo.ca (networking/communications utilities--see Libsoft directory and main directory)
  - 3. Software archives for multiple operating systems:
    - a) ftp: wuarchive.wustl.edu (Mac, IBM, etc. --see "mirrors"
    - b) ftp: gatekeeper.dec.com (Amiga, MS-Dos, Unix, etc.)
    - c) ftp: ames.arc.nasa.gov

VIII. FTP commands

<u>FTP uses elementary UNIX commands:</u>

<u>Command</u>	<u>Comment</u>
dir	list the directory
cd	change directory
cd ../	previous directory
cd pub/net	change to pub/net directory
pwd	print working directory (where am I?)
get file1, file2	download file(s)
mget	get the whole directory of files
put	upload files
ascii	set to transmit file as text
image (i), binary	set to transmit file as binary (executables)
help	help (in ftp -"man" gets help pages in Unix mode)

IX. Sample FTP session

A. Connecting

```
abacus >ftp dartvax.dartmouth.edu    <--open ftp connection to
darvax
Connected to dartvax.dartmouth.edu.
220 dartvax.dartmouth.edu FTP server (Version 6.9 Tue Oct 29
13:56:35 EST 1991)
ready.
Name (dartvax.dartmouth.edu:jfergers): anonymous       <--type
"anonymous" at prompt
331 Guest login ok, send e-mail address as password.
Password:              <--type your e-mail address as a password (it
won't be visible).
230 Please note that your hostname and userid are logged for all
transfers.
230
230 Guest login ok, access restrictions apply.          <--we're on!
```

B. Moving around the directories

```
ftp> dir                                             <---show a directory
listing
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
```

```
total 7
dr-xr-sr-x  2 root      bin            512 Dec 11  1990 bin
drwxr-sr-x  4 root      bin            512 Apr 27 15:18 dartmouth
dr-xr-sr-x  2 root      bin            512 Feb  7 01:27 dev
dr-xr-sr-x  2 root      bin            512 Nov 15  1991 etc
drwxr-sr-x  9 root      bin            512 May 12 13:26 pub
drwxr-sr-x  2 root      bin            512 Sep 19  1991 sun-dist
dr-xr-sr-x  3 root      bin            512 Dec 11  1990 usr
226 Transfer complete.
433 bytes received in 1.1 seconds (0.39 Kbytes/s)
ftp> cd pub                                    <--useful material is
usually in "pub"
250 CWD command successful.
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
**********Several lines skipped--we're in the /pub/mac
directory************
```

C. Downloading the file

```
150 Opening ASCII mode data connection for /bin/ls.
total 1667
-r--r--r--  1 root      bin          91921 Feb 11  1991
AsyncAppleTalk2.4.sit.hqx
-r--r--r--  1 5         bin          51047 Aug  3  1991
AsyncAppleTalk2.6d12.sit.h
qx
-r--r--r--  1 5         bin         317653 Aug 15  1991
AsyncPeek_1.1a10.sit.hqx
-r--r--r--  1 root      bin          44326 May 22  1991
DDP_Socket_Listener.sit.hq
x.txt
-r--r--r--  1 root      bin         464074 Apr 17  1990
DXCMDs3.4.3.sit.hqx
-r--r--r--  1 5         bin         172895 Oct 24  1991
Fetch_2.0.6.sit.hqx
-r--r--r--  1 5         bin         254871 Jun 11 17:54
Fetch_2.1b3.sit.hqx
-r--r--r--  1 5         bin          99442 Jun  9 21:35
MacPing2.0.2DEMO.sit.hqx
-r--r--r--  1 root      bin           2975 Apr  8 20:07 README
-r--r--r--  1 5         bin         124666 Nov 27  1991
dartnet.sit.hqx
226 Transfer complete.
782 bytes received in 1.3 seconds (0.58 Kbytes/s)
ftp> i                                            <--set download as a
binary (image) file
200 Type set to I.
ftp> get Fetch_2.1b3.sit.hqx                  <--download file
200 PORT command successful.
150 Opening BINARY mode data connection for Fetch_2.1b3.sit.hqx
(254871 bytes).
226 Transfer complete.
```

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```
local: Fetch_2.1b3.sit.hqx remote: Fetch_2.1b3.sit.hqx
254871 bytes received in 1.5e+02 seconds (1.7 Kbytes/s)
ftp> quit                                    <--close down ftp
221 Goodbye.
```

X. **Reconstructing Transferred Software**
  - A. Most software needs to be *converted* before it can be used
  - B. Many *binary* (executable) files are converted to *text (ascii)* for easier transmission
  - C. Files are often *compressed* or *archived* to reduce the load on the network
  - D. Software is usually needed to decode or decompress the transmitted file (available in most PD archives)
  - E. There are MANY common compression/archiving formats

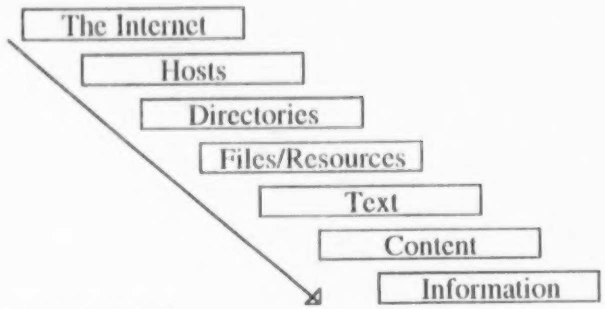
Suffix	Program(s)	Primary OS
.hqx	Binhex	Mac
.sit	Stuffit	Mac
.sit.hqx	Binhex & Stuffit	Mac
.cpt	Compact Pro	Mac
.sea	Self-extracting archive	Mac
.zip	PKZIP, PKUNZIP	MS-DOS
.Z	Compress	Unix
.tar	tar (tape archive)	Unix
.tar.Z	compress & tar	Unix
.shar	Shar, Unshar (shell archive)	Unix
.uu	UUencode, UUdecode	Unix

FTP: ux1.cso.uiuc.edu in doc/pcnet/compression (David Lemson's exhaustive list of decompression programs and formats)

(Many compression formats may be decoded by other operating systems, if you have the proper "tools". The software, however, generally runs only on the system it was designed for.)

XI. **The Client/Server Concept**
  - A. **Client:** local computer queries a remote host for information
  - B. **Server**: host (remote) computer which sends information
  - C. Client/Server automate the data/information request
  - D. Client/server software gets around many "login" technicalities
  - E. Transparent interface: resembles the user's native operating system (Mac, MS-Dos, etc.)
  - F. Connection time is minimized
  - G. Network traffic is reduced; services available to more people
  - H. Some programs will even automatically decode/decompress software in the background
  - I. The local user may not even be aware of that a remote connection is being made, or what system is being accessed--only the data matters

XII. **Internet Navigation Tools**
  - A. The search process



B. Internet Access Tools
  1. Sonoma "Libs"
     - a) Menu-driven telnet access to libraries
  2. Hytelnet
     - a) Hypertext guide to libraries
     - b) Each link loads a telnet script to connect to a library or database
  3. Gopher
     - a) What is Gopher?

       gopher n.

       1. Any of various short tailed, burrowing mammals of the family Geomyidae, of North America.

       2. (Amer. colloq.) Native or inhabitant of Minnesota: the Gopher State.

       3. (Amer. colloq.) One who runs errands, does odd-jobs, fetches or delivers documents for office staff.

       4. (computer tech.) Software following a simple protocol for tunneling through a TCP/IP internet.
     - b) Gopher was developed at the University of Minnesota (the Mama Gopher)
     - c) Exploring Gopherspace by "tunneling" and "burrowing"
     - d) Gopher links find and retrieve text, software, sound, pictures, and more
       - (1) Gopher connections are invisible mini-script files or database records
       - (2) A typical gopher "link" script

```
#
Type=1                                  What type of file?
Name=Library of Congress LC MARVEL      What is the item called?
Path=                                   In what directory path is
it?
Host=gopher.loc.gov                     On what machine?
Port=70                                 Connect to machine by
gopher
```

Gopher file types:

0	Item is a file
1	Item is a directory
2	Item is a CSO (qi) phone-book server
3	Error
4	Item is a BinHexed Macintosh file.

5	Item is DOS binary archive of some sort. Client must read until the TCP connection closes. Beware.
6	Item is a UNIX uuencoded file.
7	Item is an Index-Search server.
8	Item points to a text-based telnet session.
9	Item is a binary file! Client must read until the TCP connection closes. Beware.
+	Item is a redundant server
T	Item points to a text-based tn3270 session. (IBM mainframes)
g	Item is a GIF format graphics file.
I	Item is some kind of image file. Client decides how to display.

(3) Links to frequently visited sites can be saved as "bookmarks"
(4) The end user can create a customized "map" of the Internet using bookmarks

4. World Wide Web (WWW)
    a) WWW is the fastest-growing Internet tool
    b) Document-oriented hypertext information retrieval
        (1) Searchable links appear as marked text
        (2) Clicking or placing cursor on the hypertext link retrieves or searches the item
        (3) Links could appear anywhere: in structured menus, or within free-form text
        (4) Links can be anything: text, sound, image, video
    c) Drawbacks of WWW
        (1) Someone has to take the time to prepare the links
        (2) No current software to search the hypertext links
    d) NCSA Mosaic software
        (1) Mosaic for the Mac
        (2) Mosaic for Window
    e) WWW Sample
    Yes, Jim? lynx

```
       Welcome to WWW at the University of Kansas

      You are using a new WWW Product called Lynx. For more
      information about obtaining and installing Lynx
      please choose About Lynx

      For a description of WWW choose Web Overview
      About the WWW Information Sharing project
      WWW Information By Subject
      WWW Information By Type

              Lynx internal format sources
              University of Kansas CWIS
              Nova-Links at Nova University
              History Net Archives

                    Gopher sources
```

C Internet Search Tools
    1 Archie--Where in the Internet is that public domain program?

a) ARCHIE searches ftp sites to find a given PROGRAM name
    (1) telnet: archie.sura.net login: archie
    (2) e-mail: archie@sura.net
    (3) message: (no subject) help or prog filename_being_sought
    (4) to search, type: prog filename_being_sought
b) Archie tells you where to find a program, but you have to use ftp to retrieve it
c) Over 50 Gigabytes (50,000,000,000 bytes) of of software available

2. Veronica
    a) "Very Easy Rodent-Oriented Net-wide Index to Computerized Archives"
    b) Search for all TITLES in Gopherspace matching keywords
    c) Returned items (from many locations) appear in a standard gopher menu
    d) Select any item found from a gopher menu to retrieve it
3. Jughead
    a) Searches for MENUS in Gopherspace matching keyword(s)
4. Wide Area Information Servers (WAIS)
    a) Searches for TEXT within an indexed file or database
    b) Begin search by querying a "directory of servers" with a broad keyword
    c) Search returns a list of databases for a more refined search
    d) Searching on or more databases returns text matching a more refined search key

XIII. Usenet News

A. The Usenet is anarchy
    1. There are no system-wide administrators
    2. Anyone can propose a new newsgroup; net users "vote" whether to accept the group
    3. Evey Usenet site gets one copy of all subscribed newsgroups which all local clients share
    4. Most Usenet groups have a very high signal-to-noise ratio
        a) Some groups have several hundred postings a day
        b) Unwelcome postings can be deleted using a macro called a "kill file"

B. The Usenet is hierarchy

Newsgroup category	**Issues**
alt	controversial topics
bionet	biology
biz	business, corporate groups
bit.listserv	LISTSERV discussion groups via USENET
comp	computers, source code, software
news	news about USENET
rec	recreational groups
soc	social or cultural groups
sci	science oriented groups

C. Sample Usenet news session

```
abacus> rn
Unread news in news.answers                    587 articles
Unread news in news.newusers.questions           652 articles
Unread news in comp.sys.amiga.announce            26 articles
etc.

******** 587 unread articles in news.answers--read now? [ynq]
******** 652 unread articles in news.newusers.questions--read now? [ynq]
********  26 unread articles in comp.sys.amiga.announce--read now? [ynq]
```

```
********1637 unread articles in comp unix questions  read now? [ynq]

Article 27071 (1637 more) in c...p unix questions
Newsgroups comp unix shell,comp unix questions,comp unix programmer,news answer
s
From  Tom Christiansen <tchrist@cs Colorado EDU>

Subject  Csh Programming Considered Harmful
Followup To  comp unix shell
Originator  tchrist@wraeththu cs colorado edu
Nntp Posting Host  wraeththu cs colorado edu
Organization  University of Colorado at Boulder
Date  Wed, 11 Aug 1993 03 00 23 GMT
Lines  534

Archive name  unix-faq/shell/csh-whynot
Version  $Id  csh faq,v 1 4 93/08/10 20 58 22 tchrist Exp Locker  tchrist $

The following periodic article answers in excruciating detail
the frequently asked question "Why shouldn't I program in csh?".
It is available for anon FTP from convex com in /pub/csh whynot .


          *** CSH PROGRAMMING CONSIDERED HARMFUL ***

  Resolved  The csh is a tool utterly inadequate for programming,
        and its use for such purposes should be strictly banned!

********Long diatribe deleted [ed ]**********************
```

D "rn" command help

```
Paging commands:

SP      Display the next page.
x       Display the next page decrypted (rot13).
d       Display half a page more.
CR      Display one more line.
^R,v,^X Restart the current article (v=verbose header, ^X=rot13).
b       Back up one page.
^L,X    Refresh the screen (X=rot13).
g pat   Go to (search forward within article for) pattern.
G       Search again for current pattern within article.
^G      Search for next line beginning with "Subject:".
TAB     Search for next line beginning with a different character.
q       Quit the pager, go to end of article.  Leave article read or
unread.
j       Junk this article (mark it read).  Goes to end of article.

The following commands skip the rest of the current article, then
behave
just as if typed to the 'What next?' prompt at the end of the
article:

n       Scan forward for next unread article.
N       Go to next article.
```

```
^N      Scan forward for next unread article with same title.
p,P,^P  Same as n,N,^N, only going backwards.
        Go to previously displayed article.
The following commands also take you to the end of the article.
Type h at end of article for a description of these commands:
        # $ & / = ? c C f F k K ^K m M number e r R ^R s S u v w W Y
^ |
```

E. FAQs (Frequently Asked Questions)

F. News.answers

G. Internet Acronyms and Jargon

1. Acronyms

```
Popular (and clean) Internet acronyms:

     BTW        By the way
     FAQ        Frequently asked question
     FW         Freeware
     FWIW               For what it's worth
     FYI                For your information
     IAE        In any event
     IMHO               In my humble opinion (also IMO)
     JASE               Just another system error
     MFZ        Microsoft free zone
     OTOH        On the other hand
     PD         Public Domain
     RSN        Real soon now
     SITD                Still in the dark
     SW         Shareware
     TANSTAAFL
                There ain't no such thing as a free lunch
     TIA                Thanks in advance (also aTdHvAaNnKcSe)
     TLA        Three letter acronym (also FLA)
     TTFN        Ta ta for now
```

2. Smilies

```
 The Unofficial Smilie Dictionary (by Guy Kawasaki)
 -------------------------------


 :-)   Your basic smilie. This smilie is used to inflect a
sarcastic or
       joking statement since we can't hear voice inflection
over Unix.
 ;-)   Winky smilie. User just made a flirtatious and/or
sarcastic remark.
       More of a "don't hit me for what I just said" smilie.
 :-(   Frowning smilie. User did not like that last statement or
is upset
       or depressed about something.
 :-I   Indifferent smilie. Better than a Frowning smilie but not
quite as
       good as a happy smilie
 :->   User just made a really biting sarcastic remark. Worse
```

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```
than a :-).
;-> User just made a really devilish remark.
;-> Winky and devil combined. A very lewd remark was just made.

many, many more deleted....
```

XIV. **Campus Wide Information System (CWIS)**
- A. Should my campus have a CWIS?
- B. What should the CWIS contain?
  - 1. Menu structure
    - a) Logical skeleton
      - (1) Avoid long menus with "everything"
      - (2) Avoid deep pits of nested menus
    - b) Menu structure designed to expand with time
    - c) Sensible, searchable menu titles
    - d) WAIS indexing to search large amounts of information
    - e) Links to appropriate off-campus Internet services
    - f) Abundant "help" screens
- C. Who should be responsible for the CWIS?
  - 1. CWIS administrator
  - 2. Contact persons for each section/branch
  - 3. Distribute responsibility and provide training
  - 4. Text should point all questions to the proper office
- D. Formatting information for CWIS
  - 1. Use plain ASCII text (spaces, no tabs)
  - 2. Use cross-platform formats for non-text files
    - a) .GIF or .JPEG for graphic images
    - b) .hqx or .zip format for binary files
- E. CWIS issues
  - 1. Lack of common CWIS standards or formats
  - 2. Access is both universal and limited
    - a) Information equity for non-networked on-campus people
    - b) The whole world is watching
  - 3. Privacy rights vs public access
  - 4. Who provides CWIS user support
    - a) Technical support
    - b) Information support
  - 5. Proprietary considerations and off-campus access
  - 6. Network traffic and the ethics of "piggy-backing" to other services
  - 7. Censorship and free speech
  - 8. Using the CWIS as a simple file server
    - a) Distributing public domain software
    - b) Distributing course-related materials
    - c) Distributing campus polices, commitee minutes, etc.
- F. Institutional Research considerations
  - 1. Designing Electronic Factsheets
  - 2. CWIS or EIS?
  - 3. Are others posting accurate information?
  - 4. Campus marketing
- G. Sample CWIS
  - 1. Skidmore College gopher, Introductory menu

Skidmore College gopher server

---

1. Tell me about this gopher.
2. Help! How do I ... /
3. ....
4. Connect to library catalogs/
5. The Electronic Reading Room/

--> 6. College Resources, Policies, and Practices/

7. Events at Skidmore and the local area/
8. Campus Bulletin Board (for sale, rides, ...)/
9. Saratoga Area Information/
10. ....
11. Connect to gophers at other sites around the world /
12. New, untested items/

2. Skidmore College gopher, College Resources, Policies, and Practices menu

College Resources, Policies, and Practices

1. Formal Policy Statements (Fac. Handbook, AIG, Catalog, ...)/
2. Proposed Policies Still Under Review/
3. Information about Programs, Offices, and Departments/
4. Informal tips, suggestions, helpful practices/

--> 5. Skidmore Electronic Fact Book (6/93)/

3. Skidmore College gopher, Skidmore Electronic Fact Book menu

Skidmore Electronic Fact Book (6/93)

--> 1. Fall enrollment by ethnic code.

2. Fall enrollments by class year (3 years)
3. Fall total enrollment by location
4. Foreign students by geographic origin
5. Majors by department
6. Majors by size
7. Summary course enrollments by department
8. Summary of opening Fall enrollments

4. Skidmore College gopher, Fall enrollment by ethnic code menu

RACIAL/ETHNIC IDENTIFICATION

YEAR	BLACK	AM IND	ASIAN	HISPANIC	NR ALIEN	NOT REP	WHITE	TOTAL
1992	66	8	74	86	24	36	1849	2143
1991	66	5	74	76	24	30	1881	2156
1990	73	3	64	56	22	0	1921	2139
1989	67	0	59	47	21	6	1974	2174
1988	54	0	49	35	27	0	2000	2165
1987	54	0	43	36	29	0	2064	2226
1986	47	1	39	30	27	13	2001	2158
1985	46	0	35	27	23	24	2022	2177
1984	47	0	38	30	21	43	2001	2180
1983	39	1	26	33	22	24	1997	2142
1982	36	1	28	32	34	31	1996	2158
1981	46	2	23	29	34	87	1986	2207
1980	56	1	16	21	37	109	1933	2173
1979	50	2	13	13	27	285	1692	2082

etc...

XV. **"Live" Conferencing on the Internet**
A. Talk
1. Unix-based program for one-on-one conversations
2. Useage: "talk username@site.edu"--wait for party to respond
3. Dialog is carried on in a split screen
4. Control-C breaks off conversation
B. IRC (Internet Relay Chat)
1. CB Radio work-alike
2. Multiple "channels" are available
3. Allows for conferencing
C. MUDs (Multiple User Dungeons)
1. Role-playing adventure games in real time
2. MUSEs (Multiple User Shared Experiences)
3. MUSHes (Multiple User Simulated Hallucinations)
D. CUSeeMe
1. Cornell University video conferencing project
2. Transmits "packet video" in real time over the Internet
3. Mac only: any machine can receive; Macs with camera and VideoSpigot software and board can transmit
4. No audio; text appears as "subtitles" beneath the images
E. MBone
1. Transmits video and audio

XVI. **The "Outer Nets"**
A. Commercial Services
1. Compuserve
2. GEnie
3. America Online
4. Prodigy
5. Delphi
6. Bix
B. Public Systems
1. Freenets
a) Cleveland Freenet telnet freenet-in-a.cwru.edu
2. Fidonet

XVII. **Finding Information and Data**
A. FaxGate
Send a fax by e-mail
mail FaxGate@elvis.sovusa.com message: help
B. MOLIS (Minority Online Information Service)
Information about minority institutions, scholarships, etc.)
telnet: fedix.fie.com login: molis
C. Lou Harris Information Center
Archive of over 750 Harris polls. (Fee charged)
tn3270: 128.109.157.5 logon: irss1 password: irss
D. Project Gutenberg Electronic Texts
electronic texts of a growing number of books
CIA World Factbook; summary of 1990 census data; thesaurus
ftp: mrcnext.cso.uiuc.edu directory: etexts
E. OBI Electronic Texts
contains many classic etexts not in Project Gutenberg
ftp: world.std.com directory: OBI

F. Oxford Text Archive
largest etext archive; generally older works and classics (fees charged--read help documents)
email: LISTSERV@BROWNVM (for catalog)
message: (no subject) GET OTALIST FORMAT
G. Music and Lyrics Archives
ftp: vacs.uwp.edu dir: pub/lyrics file:files.directory
H. The Digital Tradition Folksongs database
words to 3500 folksongs / music to 2000 songs
ftp: cs.uwp.edu or beta.xerox.com
I. LawNet
Law and judicial information
telnet sparc-1.law.columbia.edu (login: lawnet)
J. Library of Congress cataloging
telnet dra.com
guest users may search by author/title, ISBN, ISSN, LCCN
K. Geographic Name Server
telnet: martini.eecs.umich.edu 3000
database with place names, population, elevation, zip, area code, latitude, longitude of U.S. cities
L. The Weather Underground
telnet madlab.sprl.umich.edu 3000
check weather in U.S. or Canadian cities
M. Weather maps
ftp vmd.cso.uiuc.edu (hour by hours maps in .GIF format)
N. Netlib Mathematical Software Distribution System
ftp: research.att.com login: netlib directory:all
telnet: research.att.com login: walk
e-mail: netlib@.ornl.gov or netlib@research.att.com
message: (no subject) send index
O. Statlib Statistical Software and Data Distribution System
ftp: lib.stat.cmu.edu login: statlib password:your address
e-mail: statlib@lib.stat.cmu.edu
message: (no subject) send index
soltfware, datasets, algorithms, etc.
P. ERIC (Education Resources Information Center)
Abstracts of over 700 educational periodicals
use Gopher or WAIS for easiest access
or telnet: suvm.acs.syr.edu command: SUINFO (use tn3270 emulation)
Q. Cleveland Freenet
a "National Public Telecommunications Network". A public bulletin board with historical documents, Supreme Court decisions, consumer information and much more
Also acts as a gateway to other Internet sources
telnet: freenet-in-a.cwru.edu (register for full access)
ftp: ftp.cwru.edu (limited access to freenet resources)
R. Supreme Court decisions
ftp: ftp.cwru.edu directory: hermes
S. U.S. Senate Bibliographies
ftp: ncsuvm.cc.ncsu.edu dir: senate/readme.gwp9108
email: listserv@ncsuvm.cc.ncsu.edu

- message (no subject): get readme gwp9108 senate
  Bibliographies of Senate hearings and publications for 99th to 102nd Congresses
- T. Congressional delegations
  - ftp: pit-manager.mit.edu in directory pub/activism/congress
  - information about state Congressional delegations
- U. NASA SpaceLink
  - telnet: spacelink.msfx.nasa.gov login: NEWUSER (userid)
- V. CARL (Colorado Association of Research Libraries)
  - telnet: pac.carl.org access to various library catalogs
- W. ISAAC database
  - telnet: isaac.engr.washington.edu -or- 128.95.32.61
  - requires password, has institutional research files, MS-DOS oriented
- X. Shakespeare's Works
  - for best access: use Gopher
- Y. PENpages
  - telnet: psupen.psu.edu login:PNOTPA
  - agricultural database with general & consumer information
- Z. Stock Market Report
  - telnet a2i.rahul.net (login: guest)
  - This is a fee-based public access Unix system, but the stock market report is available to those with guest access
- AA. MELVYL telnet melvyl.ucop.edu various library catalogs in U. of California system
- AB. DDN NIC telnet nic.ddn.mil Internet info, find addresses, etc.
- AC. Campus Wide Information Servers (CWIS)
  - MIT TECHINFO
    - telnet: techinfo.mit.edu
    - ftp: techinfo.mit.edu (mac client/server interface)
  - PENNinfo
    - has economic statistics database
    - telnet: penninfo.upenn.edu
  - Univ. of North Carolina at Chapel Hill BBS
    - telnet: bbs.oit.unc.edu (login: info--must sign up for userid)
    - access: USENET news, WAIS, Internet libraries & more
  - University of Maryland
    - good source of economic data, computer info, etc.
    - telnet: info.umd.edu (login: INFO)
    - ftp: info.umd.edu directory:info
  - GOPHER (U. of Minnesota and many others)
  - List of Campus Wide Information Systems
    - ftp: ftp.oit.unc.edu directory: /pub/docs/cwis-l

XVIII. Finding People

- A. Campus phone directories
  - 1. many are available via gopher to campus CWIS
  - 2. "ph" or "qi" style directories allow search by name, dept., dorm, etc.
- B. FINGER
  - 1. finger username@"internet.site".edu sometimes works
  - 2. finger @internet.site shows all who are currently logged on
- C. WHOIS
  - 1. telnet: nic.ddn.mil (type WHOIS after connect)

  - 2. email: service @nic.ddn.mil
  - 3. whois Lastname
- D. USENET White Pages mail server
  - 1. list of all posters to USENET
  - 2. email: mail-server@pit-manager.mit.edu
  - 3. message: (no subject) send usenet-addresses/Foo (Foo=last name to be searched)
- E. White Pages: Online X.500 Directory
  - 1. telnet wp.psi.com login: fred
  - 2. over 225,000 users, name, address, title, etc.
- F. NETFIND
  - 1. telnet: BRUNO.CS.COLORADO.EDU login: netfind
  - 2. tries to find persons by name, location, login name, etc.
- G. PARADISE Directory Service
  - 1. telnet hypatia.umdc.umu.se login:de
- H. Knowbot
  - 1. Knowbot automatically queries a number of the largest directories for names
  - 2. telnet: sol.bucknell.edu 185 (no password)
  - 3. email: kis@sol.bucknell.edu
  - 4. query Firstname Lastname

XIX. The Future of the Internet

- A. Netwide Standards
  - 1. Interconnectivity / Interoperability
  - 2. Modularity
  - 3. Development of URL / URN / URC Standards
    - a) Uniform Resource Locators
      - (1) ftp://info.cern.ch/pub
      - (2) http://info.cern.ch/hypertext/WWW/Addressing/URL/Overview.htm
    - b) Uniform Resource Name
    - c) Uniform Resource Citations
    - d) Universal Person Locator
  - 4. Security and Validation
    - a) Kerberos software authenticates and validates users for system access
    - b) Digital signatures
    - c) Encryption / Decryption standards
- B. AAA "Access Anytime Anywhere"
  - 1. Phone companies / cellular networks
  - 2. Interactive cable systems
  - 3. Wireless access
  - 4. BITNET III
    - a) Project to allow users to dial a local number from any city to connect to home campus
- C. TANSTAAFL?
  - 1. What does the Internet really cost? Who pays?
  - 2. Should the Internet be privatized?
  - 3. Creeping commercialization
  - 4. Who should provide commercial services?
  - 5. Equity issues

XX. "How-to" and "Where-to" Documents about the Networks

- A. Brendan P. Kehoe. Zen and the Art of the Internet. 1st. ed. January 1992.
  - 1. ftp: uxc.cs.uiuc.edu directory:/pub/zen.guide-1.0.ps

2. Probably the best introductory guide available
a) 2nd ed. (commercial version). Englewood Cliffs, NJ: Prentice-Hall
b) ISBN 0-13-010778-6. $22.00
B. Ed Krol. The Whole Internet User's Guide and Catalog.
1. Sebastopol, CA: O'Reilly and Associates. ISBN 1-56592-025-2
C. NorthWestNet User Services Internet Resource Guide
1. ftp from ftphost.nwnet.net in nic/nwnet/user-guide directory (reference work: approx. 300 pages)
D. Information Available on the Internet: A Guide to Selected Sources (April 1992). SuraNet Network Information Center.
1. ftp: ftp.sura.net in directory:public/nic
2. also: how.to.email.guide
3. also: how.to.telnet.guide
4. also: how.to.ftp.guide
E. NYSERNet. New User's Guide to Useful and Unique Resources on the Internet. v. 2.0. (October 1991.) $25.00 from NYSERNet Inc., 111 College Place, Syracuse, NY 13244
F. Tracey LaQuey and J.C. Ryer. The Internet Companion: A Beginner's Guide to Global Networking.
1. Reading, MA: Addson-Wesley, 1993
2. ISBN 0-201-62224-6 $10.95
G. MAAS Internet help files
1. email: fileserv@shsu.edu
a) message: (no subject) SENDME MASSINFO
b) excellent condensed listing of hundreds of network documents
H. Documents for BITNET users
1. BITNET.USERHELP
a) mail to: NETSERV@BITNIC
b) message: GET BITNET USERHELP
c) VM/CMS: TELL LISTSERV AT BITNIC SENDME BITNET USERHELP
d) VMS/JNET: SEND LISTSERV@BITNIC "SENDME BITNET USERHELP"
2. MAIL.MANNERS (guide to proper e-mailing)
a) mail to: LISTSERV@BITNIC
b) message: (no subject) SENDME MAIL MANNERS
3. BITFTP
a) mail to BITFTP@PUCC, message HELP
I. Billy Barron, Numeric IP addresses of Internet Online Bibliographic Databases. Univ. of North Texas
1. ftp: ftp.unt.edu in directory: library/LIBRARIES.TXT
2. Large listing of known telnet library sites
J. RFCs (Requests for Comments) (100s of somewhat technical papers about the Internet)
1. RFC1208.TXT. O. Jacobsen & D. Lynch. A Glossary of Networking Terms. (March 1991).
2. RFC1206.TXT "FYI on Questions and Answers: Commonly Asked 'New Internet Users' Questions".
3. RFC1290.TXT. J. Martin. "There's Gold in Them Thar Networks! -or- Searching for Treasure in all the Wrong Places." (December 1991)
4. RFC1207 "Experienced Internet Users Questions"
5. ftp: ftp.nisc.sri.com directory: rfc/rfcxxxx.txt

K. NEWFAQ.NEWUSER (frequently asked questions by new USENET users)
1. ftp: pit-manager.mit.edu in directory: pub/usenet/news.announce/newusers/Answers_to_Frequently_Asked_Questions
L. InfoPop2.0 (MS-Dos) Popup hyperguide to the Internet
1. ftp: gmuvax2.gmu.edu directory: library (download as binary)
2. self-extracting file (untested)
M. NNSC Internet Tour HyperCard stack (Mac)
1. a good introduction and reference for Mac users
2. comes with Local Info stack for user's personal notes
3. ftp: nnsc.nsf.net directory: internet-tour
N. The Big Dummy's Guide to the Internet
1. sumex-aim.stanford.edu (hypercard stack in the comm/ directory)
O. The Internet Starter Kit for Macintosh, by Adam C. Engst.
1. Published by Hayden Books. ISBN# 1-56830-064-6. $29.95 U.S.A.
2. $37.95 Canada.
P. Roy Tennant, J. Ober, and A.G. Lipow. Crossing the Internet Threshold: An Instructional Handbook
1. Berkeley, CA: Library Solutions Institute and Press, 1993.
2. ISBN: 1-883308-01-3. $45.00 (primarily for trainers
Q. Internet World magazine
1. subscription: INTERNET_WORLD@Enews.COM

XXI. Network Organizations

A. CPSR Computer Professionals for Social Responsibility
1. P.O. Box 717, Palo Alto, CA 94302
2. cpsr@clsi.stanford.edu
3. 415 322-3778
B. National Science Foundation
1. 1800 G St. NW, Washington, DC 205500
2. 202 472-5108
C. EFF The Electronic Frontier Foundation, Inc.
1. 155 Second St. Cambridge, MA 02141
2. eff@eff.org
3. 617 864-1550
D. CNI Coalition for Networked Information
1. 1527 New Hampshire Ave. NW, Washington, DC 20036
2. info@cni.org
3. 202 462-7849
E. The Internic Network Information Center
1. c/o Genral Atomics, P.O. Box 85608, San Diego, CA 92186
2. info@internic.net
3. 1-800-444-4345
F. CNIDR ("Snyder") Center for Network Information Discover and Retrieval
1. ftp: ftp.cnidr
2. telnet cndir.org (login: demo)

XXII. Where to find or test some recommended Internet tools

I. Essential Connectivity Tools
A. TCP/IP (Transmission Control Protocol/Internet Protocol)
1. MacTCP for Macintosh
2. There are several (sometimes incompatible) TCP/IP protocols for MS-DOS
B. NCSA Telnet or Clarkson University Telnet
1. Versions exist for Mac and Dos

- C. TN3270 (for telnet to IBM 3270 sites)
- D. Kermit, Procomm, ZTerm or other telecommunications software

II. Electronic Mail Standards
- A. MIME
  - 1. MIME is an emerging standard for transferring all types of files across operating platforms as mail attachments
  - 2. MIME can transfer text, binary, audio, video, etc.
- B. POP (Post Office protocol)
  - 1. POP is a mainframe-based protocol used to transfer messages from the mainframe to a personal computer
  - 2. The PC automatically and periodically checks the mainframe to see if there is mail. New mail is automatically downloaded
  - 3. The end user never needs to log on to the mainframe

III. Unix mail systems
- A. Unix 'mail'
- B. Pine
- C. Elm
- D. "Pico" or "Emacs" text editors are easier to use than the default "vi" editor

IV. Personal computer mail servers
- A. These use POP mail protocols and are more user-friendly than the mainframe versions.
- B. Eudora
  - 1. ftp: sumex-aim.stanford.edu directory: info-mac/comm/eudora-14.hqx
  - 2. Commercial Dos version should be available
- C. NuPop
  - 1. MS-Dos
- D. PopMail
  - 1. Mac and MS-Dos
- E. Pegasus

V. Compression/Conversion Software
- A. Mac: Stuffit, Compactor Pro, BinHex 5.0
- B. MS-DOS: Pkunzip/Pkzip, lharc
- C. Unix: tar, compress, uncompress

VI. USENET News Readers
- A. Nuntius (Mac)
  - 1. ftp sumex-aim.stanford.edu directory: info-mac/comm/
- B. TheNews (Mac)
  - 1. ftp sumex-aim.stanford.edu directory: info-mac/comm/
- C. Newswatcher (Mac)
  - 1. ftp sumex-aim.stanford.edu directory: info-mac/comm/
- D. SNUZ.EXE (MS-DOS)
- E. rn or nn (Unix)

VII. Network Gateways Software
- A. Archie
  - 1. Telnet: archie.sura.net
    - a) login: archie
    - b) "prog filename" begins search for "filename"
  - 2. email: archie@archie.sura.net
    - a) no subject; "prog filename" is body
- B. Gopher
  - 1. Gopher is an excellent front-end for a campus-wide information system (CWIS)

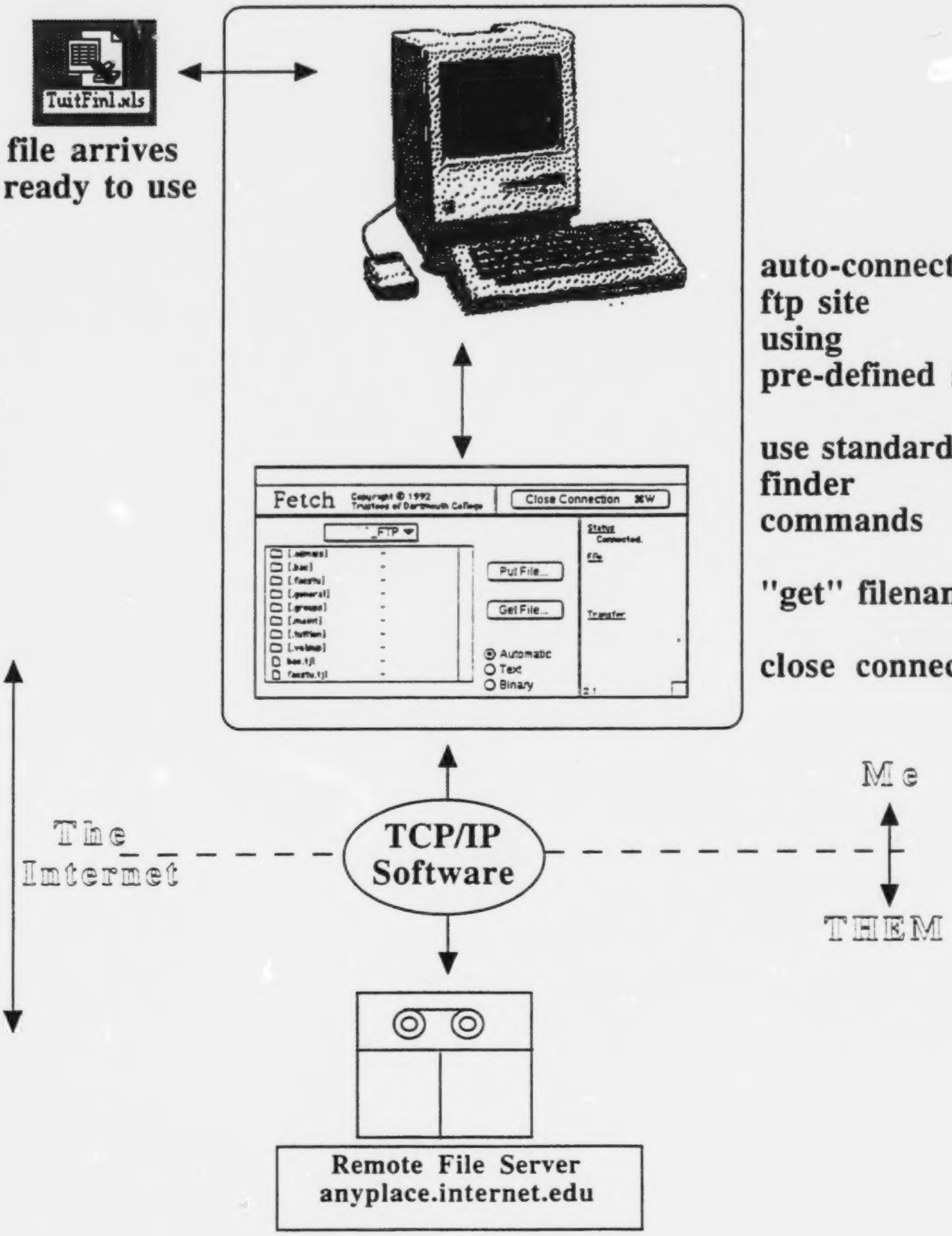
  - 2. Telnet: telnet consultant.micro.umn.edu or gopher.uiuc.edu
  - 3. Gopher software: ftp: boombox.micro.umn.edu dir:pub/gopher (many versions available)
    - a) Mac: TurboGopher or GopherApp
    - b) Dos: PCGopher
    - c) Windows: HGopher (requires "Winsock" software)
  - 4. Gopher by email: gophermail@join.ad.jp
    - a) send blank message; reply is a gopher menu; you reply by placing an "X" in front of the menu item you wish to retrieve
- C. Fetch (Mac)
  - 1. automatically decompresses/decodes files
  - 2. ftp: dartvax.dartmouth.edu directory: /pub/mac (or sumex archive)
  - 3. Highly recommended!
- D. Hytelnet
  - 1. ftp: access.usask.ca directory: pub/hytelnet
  - 2. available for Mac, MS-DOS, Unix, VMS
- E. NCSA Mosaic
- F. WAIS
  - 1. ftp: quake.think.com directory/wais
  - 2. WAIStation for Mac is recommended. Unix, Windows versions available
- G. Lib.Sh
- H. WWW (World Wide Web):
  - 1. Mac: NCSA Mosaic, MacWWW
  - 2. Windows: Cello (ftp from fatty.law.cornell.edu) or NCSA Mosaic for Windows
  - 3. MS-DOS: use Unix
  - 4. Unix: WWW line browser or Lynx
  - 5. Telnet: info.cern.ch or eies2.njit.edu
  - 6. "Lynx" telnet to ukanaix.cc.ukans.edu (login: www)
- I. CUSeeMe
  - 1. beta version by ftp from gated.cornell.edu pub/video/CU-SeeMe.XXX.bin

VIII. Talk
- A. hold "real-time" conversations; an alternative to e-mail
  - 1. available as a system command on most Unix systems

IX. IRC telnet client
- A. telnet bradenville.andrew.cmu.edu

X. Most tools are available for FTP in the standard PD archives (info-mac, wuarchive, sunsite, simtel). (if all else fails, try "archie")

File transfer with Macintosh "Fetch" client/server access to the Internet using Fetch


TuitFinl.xls
Fetch
Copyright © 1992
Trustees of Dartmouth College
Close Connection ⌘W
FTP
Put File...
Get File...
● Automatic
○ Text
○ Binary
Status
Connected.
File
Transfer
The Internet
TCP/IP Software
Me
THEM
Remote File Server
anyplace.internet.edu

file arrives
ready to use

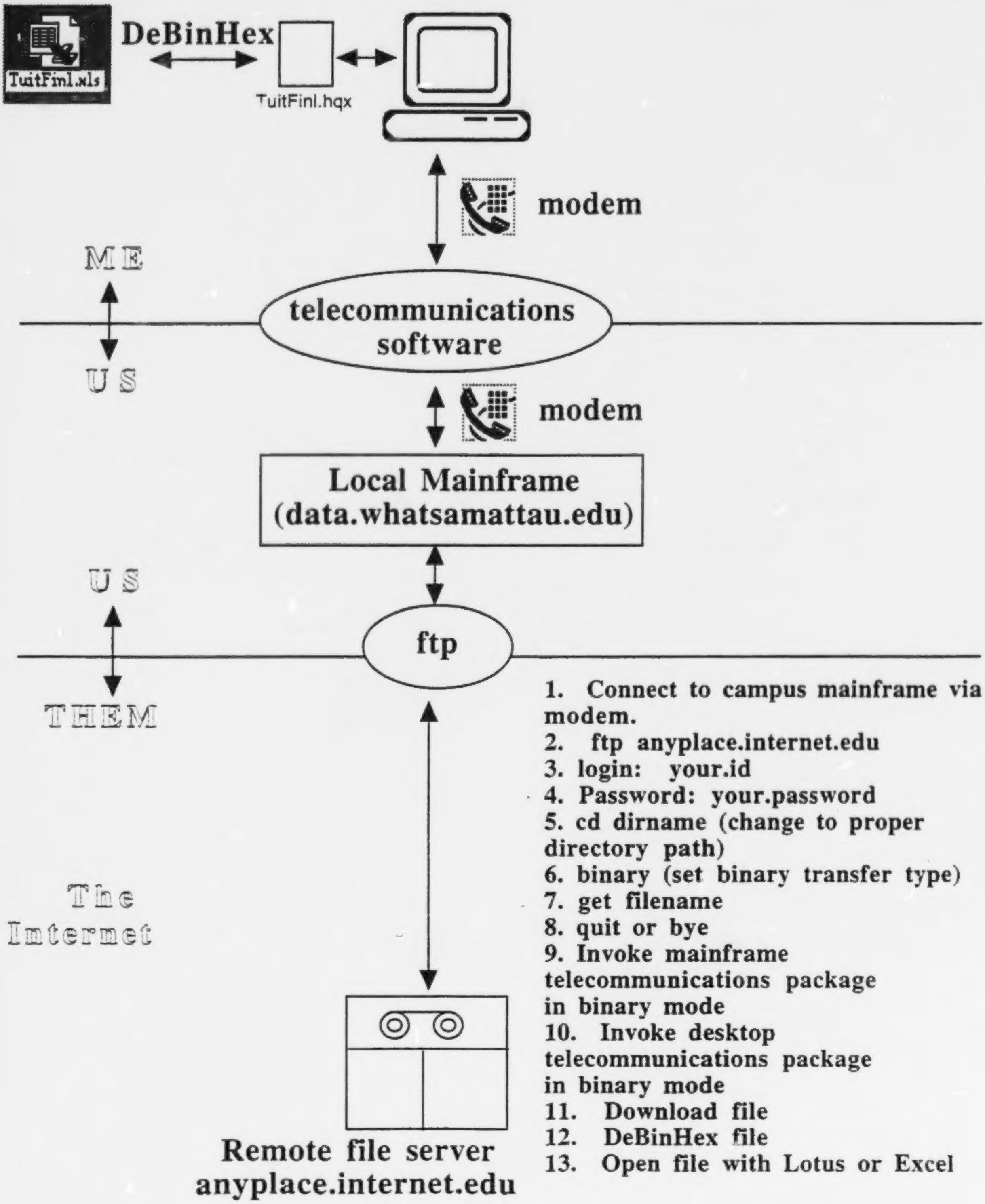
auto-connect to
ftp site
using
pre-defined script

use standard Mac
finder
commands

"get" filename

close connection

File transfer without direct Internet access from desktop computer


TuitFinl.xls
DeBinHex
TuitFinl.hqx
modem
ME
telecommunications software
US
modem
Local Mainframe (data.whatsamattau.edu)
US
ftp
THEM
The Internet
Remote file server anyplace.internet.edu

1. Connect to campus mainframe via modem.
2. ftp anyplace.internet.edu
3. login: your.id
4. Password: your.password
5. cd dirname (change to proper directory path)
6. binary (set binary transfer type)
7. get filename
8. quit or bye
9. Invoke mainframe telecommunications package in binary mode
10. Invoke desktop telecommunications package in binary mode
11. Download file
12. DeBinHex file
13. Open file with Lotus or Excel

THE INTERNET TOOLBOX (? indicates software untested)

Internet Resource	Macintosh	Unix	MS-DOS
Electronic Mail	Eudora 1.4	Elm Unix mail Pine *Editor* vi, pico, emacs	Pegasus ? readmail.exe ? Nupop ? PopMail ? PC-Eudora ? (TBA)
Telnet/TN3270 (use TN3270 for IBM mainframes)	NCSA Telnet 2.5 Comet (a tn3270 tool)	telnet/tn3270	telnetd.zip ? CUTCP package ?
FTP (File Transfer Protocol)	Fetch 2.1	ftp	simpleftp ? goftp.com ?
File compression/conversion	Stuffit family	compress/uncompress tar	PKzip/PKunzip
(GIF/JPEG/anim/audio formats)	many converters		many converters
Usenet News	Newswatcher Nuntius	rn nn	news.exe? snuz.exe
Information Locators	Archie client WaisStation MacWWW	archie, veronica*, jughead, traveller World Wide Web Sonoma.sh SWAIS finger, whois, nslookup Netfind, Knowbot	InfoPop 2.4 ?
"Front-ends"	GopherApp TurboGopher Mac Hytelnet MacWWW NCSA Mosaic	Sonoma.sh (Libs.sh) Hytelnet ITS front end menu Lynx (WWW client)	PC Gopher II ? HGopher (Windows) ? Hytelnet ? libnet.exe ? NCSA Mosaic
Dial-in connection	SLIP NetSerial AppleTalk Remote Access ? PPP (point to point protocol)	Modem/serial dial-in	?

*Very Easy Rodent-Oriented Net-wide Index to Computerized Archives.

Hytelnet, Gopher, & WWW Compared	Hytelnet	Gopher	World Wide Web (WWW)
Availability	Mac, MS-DOS, Unix, Remote connect	Mac, MS-DOS, Unix, Remote connect	Mac, Unix, Windows (TBA) Mosaic software (currently in beta test) is highly recommended
Software Support	One-person support by Peter Scott	Support by Gopher Team, others	Originated at CERN (Switzerland)
Upgrades	Software interface stable. Expandable? Internet site access upgrades must be installed locally Major updates several times a year, or install daily updates by hand	Frequent software upgrades as product evolves and adds features Internet site access is updated dynamically without need for local support. New sites "just appear".	New links appear on net as they are installed. Local links must be custom installed
Network Focus	Launches telnet scripts to ease connection to libraries and remote databases. Script-based	A new Internet protocol, intended as a document delivery system Client/server orientation reduces network load	Does document delivery, but adds hypertext links to references within the retrieved document and potentially throughout the Internet. Power platform for self-published material
Internet Gateways	Gateways to practically everything	Gateways to practically everything	Gateways to practically everything
	More libraries are available via Hytelnet	Interacts better with other Internet protocols, client/server applications	WWW is the most rapidly growing service on the Internet.
Menu system	Hierarchical Tree (no leaps across branches) Can't be easily configured by local administrator or enduser	Deeply nested menus (approaches a true hypertext system) Infinitely configureable by either local administrator or enduser, by setting bookmarks	Web-like (closest to a true hypertext system) Links can be menu items, but are generally entered by selecting hilited keywords embedded within standard text.
	No shortcuts to frequently used sites	User-defined "Bookmarks" to other systems	User-defined "Bookmarks" to other systems
	Standard interface across platforms	Resembles interface on local machine	Resembles the printed page
Search philosophy	Structured, logical, linear, one at at time	"Burrowing", browsing, intuitive, non-linear, multiple connections Gopherspace is growing more organized through voluntary efforts by institutions and individuals to add "structure" to the resources.	Non-linear. Excellent for following "threads" within and across documents.
File capabilities	Primarily text. Transfer by mail or by saving telnet scrollback. No conversion facilities	Text, images, animations, sounds, binary files FTP, telnet, print to PC screen, New features (MIME, secure access, online forms) being added Works well with "helper applications" to convert, view files.	Text, images, animations, sounds, binary files FTP, telnet, print to PC screen, New features (MIME, secure access, online forms) being added Works well with "helper applications" to convert, view files.
Software Support	Primarily by Computer Center/Library technical staff Updating may be difficult Can be locally customized, with difficulty	Potentially campus-wide if set up as a Campus-wide information system "It grows as it goes"	Can serve as basis for Campus-wide information system. Adding links to local server requires some knowledge of HTML (HyperText Markup Language) "It grows as it goes"
Program location	Database of telnet sites is large and generally resides on mainframe	Resides on mainframe or pc, but customized sub-gophers can be established on departmental PCs or file servers	Resides on mainframe or pc. Anyone with a basic knowledge of HTML can "self-publish"
Problems	User must learn remote system's commands while in telnet mode Often hard to break out of a telnet session Local clients require much disk space.	Connections often fail when remote server is busy or down Links may become outdated.	No current software similar to veronica or archie to locate hypertext links Someone has to set up the initial links. Links may become outdated.

BEST COPY AVAILABLE

+ **NEAIR Internet Workshop--Last Minute Arrivals and Updates**

WAIT!!! There's MORE!!!

+ **InternNIC Lists**
  - net-resources (information about Internet resources, 5 - 10 messages per week)
  - net-happenings (information about conferences, publications, political news, resources, etc. 4 - 8 messages per day)
  - email: listserv@is.internic.net, message: subscribe listname yourname
+ **Other lists**
  + EDPOLYAR Education Policy Analysis Archives (EPAA)
    - e-mail: listserv@asuacad.bitnet message: sub edpolyar yourname
  + NATO
    - email: listserv@cc1.kuleuven.ac.be message: sub NATODATA yourname
  + Global Network Navigator (O'Reilly & Associates)
    - "Part magazine, part catalog, part field guide" about exploring the Internet
    - Will make available an on-line hypertext version of Ed Krol's Whole Internet Catalog
    - email: info@gnn.com (O'Reilly & Associates is commercial, but the subscription is free)
  + IPCT-J Interpersonal Computing and Technology: An Electronic Journal for the 21st Century
    - Electronic contents of on-line journal; order articles through mail server
    - listserv@guvm.bitnet subscribe: IPCT-J yourname
  + NETTRAIN
    - high traffic list for Internet trainers (weekly digest available)
    - email: listserv@ubvm.cc.buffalo.edu subscribe nettrain yourname
  + Higher Education Journal (HEJ)
    - a sponsored conference of the multiple-topic HEPROC-L list
    - email: listserv@american.edu message: subscribe HEPROC-L yourname
    - to add the HEJ as a subtopic, send email to listserv@american.edu with SET HEPROC-L TOPICS +HEJ as the body of the message
+ **Government:**
  + FedWorld
    + Gateway access to over 100 government databases
      - telnet: fedworld.doc.gov
  + Department of Commerce Economic Bulletin Board (EBB)
    - Available through the University of Michigan
    - ftp una.hh.lib.umich.edu in directory /ebb
  + White House e-mail server
    - e-mail: clinton-info@campaign92.org subject: Help
  + General Accounting Office reports:
    - ftp: nptn.org in pub/e.texts/gao.reports directroy
  + President Bill Clinton's e-mail address
    - president@whitehouse.gov
  + President's Health Care Package
    + The Health Security Act text
      - email: almanac@ace.esusda.gov message: send health legis catalog
    + "The President's Report to the American People"
      - email: almanac@ace.esusda.gov message: send health-book catalog
  + OERI/U.S. Department of Education
    - over 1000 documents from National Center for Education Statistics (NCES), Educational Resources Information Center (ERIC)
    - Department of Education telephone directory
    - gopher gopher.edu.gov
  + Federal Reserve Bank New England economic data
    - ftp: neeedc.umesbs.maine.edu (yes 3 e's!) in directory /frbb
  + State Department Travel Advisories
    - to subscribe to "travel-advisories" mailing list, send a message containing the word "subscribe" to: travel-advisories-request@stolaf.edu
    - gopher: gopher.stolaf.edu in the path Internet Resources/US-State-Department-Travel-Advisories
    - ftp: ftp ftp.stolaf.edu in /pub/travel-advisories/advisories
  + GOVDOC-L Information about government documents (primarily for librarians)
    - e-mail: listserv@psuvm.bitnet message: sub govdoc-l yourname
+ **Usenet news groups**
  - alt.internet.services
  - news.newusers.important
  - news.announce.important
  + Usenet Frequently Asked Questions depository
    - ftp: rtfm.mit.edu in /pub/usenet
+ **Information by "finger" command**
  + Earthquakes
    - finger quake@geophys.washington.edu
  + NASA daily news release
    - finger nasanews@space.mit.edu
+ **Gopher sites**
  + The Electronic Newstand
    - contains contents or partial contents of current magazines, plus on-line subscription service
    - *The New Yorker, The New Republic, The Economist, Foreign Affairs, National Review, The Source, New Age Journal, Technology Review, and more*
    - gopher: gopher.netsys.com 2100
    - telnet: gopher.netsys.com login: enews (no password)
  + Library of Congress
    - gopher locis.loc.gov 70 (limited hours)
  + IBM Kiosk for Education (formerly ISAAC)
    - IBM news for education, product announcements, software reviews, etc.
    - gopher ike.engr.washington.edu 70
  + Smithsonian Institution's Natural History Gopher
    - gopher nmnhgoph.si.edu 70
+ **Telnet**
  + Daily fortune cookie
    - telnet astro.temple.edu 12345
  + Geographic name server
    - telnet martini.eecs.umich.edu 3000

- + Current time
    - - telnet serv1.cl.msu.edu 13
  - + Book Stacks Unlimited (on-line bookstore with 250,000+ titles)
    - - search by author, title, keywork, ISBN and place orders
    - - telnet books.com
  - + Compact Disc Connection
    - - search 75,000 CD titles by artist, title, song, catalog #, etc. and place orders
    - - telnet to address 157.151.0.1 (holonet.net) , username: cdc (this is a free gateway through a fee for service site--Type cdc--do not type "guest")
- + Resources
  - + InfoPop/Windows
    - - InfoPop/Windows is a freeware WINHELP (hypertext) guide to the Internet
    - - ftp.gmu.edu in pub/library (set ftp to binary, and "get ipwin112.exe"
  - + Internet Talk Radio
    - - Audio files from a radio show about the internet by ftp (very large files!)
    - - Known for its "Geek of the Week" interview
    - - For information: info@radio.com
- + Books, articles
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To Have and To Hold: On the Meaning of "Retention"

Thomas B. Flaherty
Director of Planning and Institutional Research
Central Connecticut State University

and

Jennifer A. Brown
Director of Institutional Research
Connecticut State University

Abstract

The purpose of this paper is to describe attendance patterns at Central Connecticut State University (CCSU), a public, four-year, comprehensive university and to discuss the issues that should be addressed in light of this data. Particular attention is given to the implications of the extraordinarily varied paths students follow to the baccalaureate. The relevance of retention and completion rates as usually conceived, for this type of institution as well as others, will be discussed

Synopsis of Presentation[1]

One of the most discernible trends in higher education during the 1980's and continuing into the 1990's has been the accountability movement. The expectation that institutions of higher learning would show evidence that they were delivering services of quality has now become part of the culture of higher education. Nearly every college and university now has an assessment plan, often mandated by a higher authority–the legislature or board of trustees. Usually, the plan involves some form of retention or graduation-rate measure. In the nineties, we have received instructions from the NCAA and even Congress to calculate and report on our retention of undergraduates and the rate at which they graduate. It is taken as a truism that colleges of quality keep their students and graduate them within some reasonable period of time, normally four years or a little more for four-year institutions. Few have questioned this measure of institutional "goodness;" it just seems obvious. Recently, however, Astin (1993) has raised questions about the appropriateness of this idea of retention.

Some universities and colleges, particularly four-year public comprehensives and community colleges, however, have been undergoing changes in their missions and in the make-up of their student bodies that make the whole idea of retention difficult to comprehend. Many students come to these institutions with the intention of taking a few courses to help them personally of professionally. Others come with the idea of transferring to another, perhaps more prestigious or expensive institution. Perhaps most challenging to the notion of the freshman cohort moving through to graduation—the "class"—is the fact that many of the four-year comprehensive colleges and universities take 50% or more of their incoming classes as transfer students.

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[1] A formal paper containing the material presented at the conference was not prepared. Additional details may be obtained from the authors.

First, a look at our retention data as usually reported. The chart in figure 1 provides a summary. The data here are not unlike those of other universities in the Connecticut State University system and are apparently like those reported at other similar institutions. About 25% of the freshman cohort fails to reappear for the sophomore year. Then lower attrition rates prevail until some six years later when the percentage of the freshman cohort graduating comes in at about 45%. Using earlier cohorts, we surmise that our eventual graduation rate is about 50%.

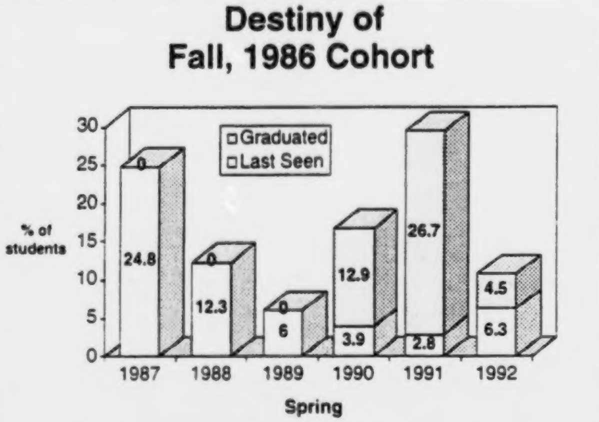

Figure 1. Retention/attrition of students entering in the Fall of 1986

At Central Connecticut State University, we knew that all of these things were true, but we also knew that retention was a far more complex matter than the current schemes for measuring it could accommodate. For this reason, and because we needed to know more about the success of students transferring in from the public community colleges, a study was conducted. We wanted to find out what the attendance patterns of our graduates had been, how many of them had transferred in how much credit from which institutions and how long it took them to graduate.

Our student database, while quite sophisticated for most purposes, simply did not contain enough detail to "track" our graduates' collegiate experience completely. Thus, we resorted to a transcript analysis. We originally hoped to analyze the transcripts of several hundred students to determine how they moved through the institution. Because of the complexity of the student's attendance patterns, the task turned out to be so time consuming, that we collected complete data on just 81 recent graduates.

In our presentation, we discussed our findings at some length. Generally, we have found that the attendance patterns of our students, both transfer and "native", vary beyond anything we had imagined. Indeed, to us, the whole definition of "transfer student" has become an increasingly fuzzy one. We have found that it is difficult to classify students in any but the most trivial ways (*e.g.*, started at our university or started elsewhere) because of the frequency of transfers—in and out. The opportunity to apply quantitative methods was far more limited than we had hoped. The complexity of attendance patterns, individual differences in the number of institutions attended, and the amount of credit earned before and during enrollment at the receiving institution and so on, reduce the utility of quantitative analysis and make case-by-case analysis necessary.

Some interesting statistics were gleaned, however. Of the random sample of 1991 grads, 41% had begun at CCSU–were *native* students–and 59% were transfer students (the latter wholly ignored by traditional retention analysis). This split is typical of our entering students. While 87% of the native grads had matriculated at CCSU in the Fall of 1985 or more recently (in the six-year frame), only 45% of transfer students offered their transfer credits in Fall, 1985 or thereafter. The whole sample reflected a range of start dates from Spring 1989 (transfer) to Fall, 1955. Overall 6% of the native students and 16% of the transfer students had initial enrollment dates of 1979 or earlier. It is important to note here that these students were persisters, not drop-outs. Figure 2 shows the entering dates of all of the students in the study and gives a good idea as to the number of years taken to complete a degree.

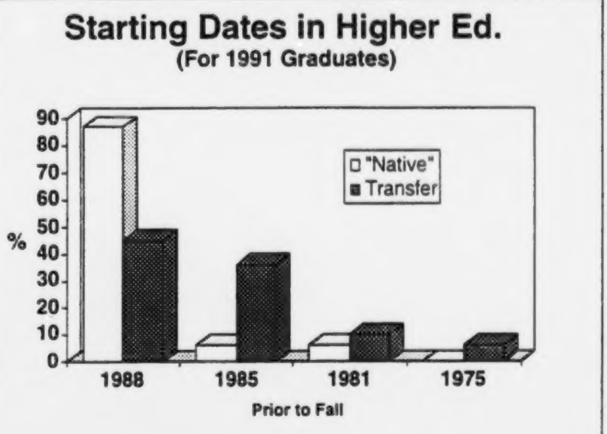

Figure 2. Graphic depiction of staring dates.

Brown (1992) has written up a detailed description of these findings and a copy of her report may be obtained from her. Also in the report are several "case descriptions" that give a much better feel for the situation than can descriptive statistics. For example: "An individual in the sample began as a full-time student in Fall, 1979, and over the next few years attended 5 semesters full-time, 5 semesters part-time and 3 summers at CCSU. After completing some semesters at CCSU, however, the student transferred to a Connecticut community college, received an Associate's degree, returned to CCSU and completed a Bachelor's degree, also completing a cooperative education work-block as part of her/his degree program. It is difficult to know whether this individual should be 'counted' as a full-time or part-time student, and whether he/she should be considered as "native" to CCSU or as a transfer student." It is perfectly clear that this student should not be seen as part of attrition, although that is precisely how he/she was seen.

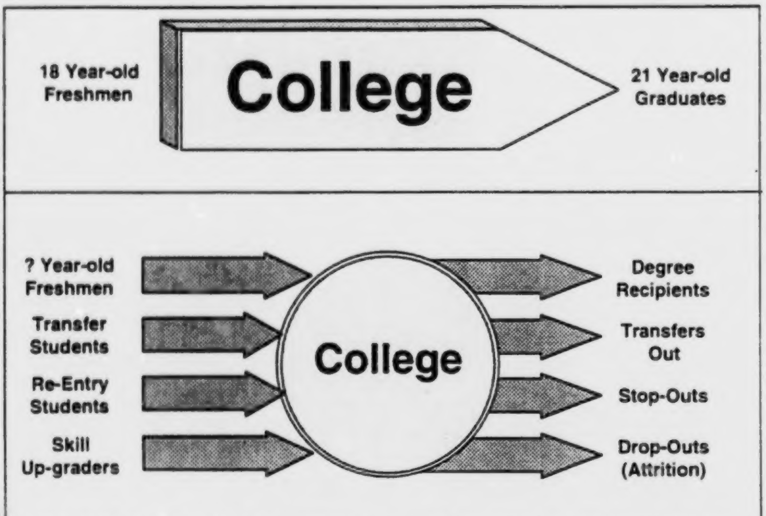

Figure 3. Two models of the college "process." The upper graph represents the traditional four-year college, the lower, the modern comprehensive university.

Many such patterns of attendance were found. This is not surprising as we exert considerable effort to ensure that students can move in and out of the system easily. It was also clear that the commonly applied definitions of retention are not only inappropriate for institutions such as CCSU, but that they actually do a great disservice to them. The application of a metric that is appropriate to a very different type of college can only lead to erroneous conclusions about these public, comprehensive universities that educate so many of our nation's students. A crude graphic representation of the different models is shown in Figure 3.

We concluded our presentation by recommending that other indicators of success be developed and adopted at public comprehensive universities; alternatives to the retention and graduation-rate statistics better suited to colleges with different missions than ours. The model becomes much more complicated, but it must to reflect the complexity of the institutions in question. For the same reasons, it is clear that community colleges are ill-served by measures that assess their ability to do what they were not designed to do.

Finally, we argued that the attendance patterns, in all their variety, found at our university, reflect a strength—an ability to meet our students' needs—not a shortcoming. A great many of our students would be unable to attend and complete their college educations if restricted to the traditional attendance pattern: four years, full-time and out.

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MAKING THE MOST OF THE MISSION REVIEW:
A TOPICAL CASE STUDY

Eleanor Fujita
Director, Institutional Research
and Mark Oromaner
Dean, Planning and Institutional Research
Hudson County Community College, Jersey City, NJ

The mission statement of a college is visited with some regularity in response to demands from accrediting associations and from changes in the internal and external environments. This case study outlines the steps taken by one college during its mission review and discusses the role of the mission review in the revitalization of that institution.

The Function of Mission Statements

The manifest value of college mission statements is open to debate. This is nowhere illustrated more clearly than by Warren Martin in his serious but entertaining chapter on the value of the mission statement:

> A riddle: What is deep yet lofty, broad yet complex, important yet ignored? Not metaphysics, though that's a good guess. Not politics in Argentina, though your persistence is admirable. Not a gingerbread house, though now you're getting close. The answer? College mission statements.
>
> The mission statement is the foundation on which the House of Intellect stands. And lofty are the utterances that express the importance of our college's mission. Indeed, they float like puffy clouds over our solidly positioned edifice. Broad is the applicability assigned these statements; so broad that they are thought to cover every contingency. Yet, narrow is the gate to understanding them, and few there be that find it. No wonder, then, given the mission statement's depth and height, breadth and density, that it is so often ignored. (1985, 40)

He goes on, however, to advocate for a mission statement as the opportunity for a college to distinguish itself, and as a guiding force for organizational movement, "Despite its flights of rhetoric and sweeping generalizations, a good mission statement informs behavior and helps members of the community decide when to say no and when to say yes. It is a statement of intention that affects practice" (61).

It has been contended and supported by researchers that a clearly articulated and commonly held mission is related to institutional effectiveness and well-being (Smart and Hamm 1993). This was found true in two-year as well as four-year colleges by Smart and Hamm. They further found, however, that the complexity of the two-year college mission was not necessarily related to institutional effectiveness: colleges emphasizing occupational programs, transfer programs *and* continuing education (tripartite mission) and colleges emphasizing only occupational programs (singular mission) were both found effective on more indices than those emphasizing occupational and transfer programs (dual mission). This would suggest that the complexity of mission and clarity of mission are not necessarily incongruent entities.

However, there appears to be disagreement as to the importance of unanimity among constituencies on a college's mission. Smart and Hamm note that researchers Chaffee and Ewell found agreement to be important for either the "'turnaround' strategies" or "perceptions of institutional performance" (490). Others contend as well that "people's perceptions are critical to an institution's well-being," and therefore congruency between the desired and perceived image is important for marketing, recruiting, and gaining resources (Terkla and Pagano 1993).

Birnbaum found, however, that agreement on college goals among governing board members, presidents, and senior academic administrators and faculty members appeared related to institutional type with the least consistency among leaders in universities and community colleges (1988). This finding could be construed to suggest that there may be a mediating effect confounding the relationship between goal agreement and institutional functioning. After noting that some would argue that goal diversity might reflect confusion about the mission of the college which could hamper institutional effectiveness, Birnbaum posited that it could be the contrary: that "pluralistic goals" may enhance effectiveness of colleges facing "environmental and programmatic constraints" such as universities and community colleges (28). "Goal diversity increases the probability that different environmental cues will receive attention and that advocates will exist to support the needs of different programs" (29).

Elsewhere Birnbaum, basing his work on Merton, has explored the manifest and latent functions of activities in college governance, particularly the role of academic senates (1989). He proposed that senates fulfilled many purposes (as symbol, status provider, garbage can and deep freeze, attention cue, personnel screening device, organizational conservator, ritual and pastime, and scapegoat), and that these latent functions were valuable to the organization even when manifest functions seemed to be lacking. In a similar way, the review of a mission statement, may well serve both latent and manifest functions. The following case study of a mission review process illustrates this point.

A Case Study of a Mission Review

Hudson County Community College, in part because of rapid leadership turnover, a lack of permanent facilities, a distinct arrangement for instructional delivery, and comparatively low outcome ratings, was under extreme pressure during the Spring and Summer of 1992 to defend its existence.

In response to a number of forces, e.g. pressure from the state Department of Higher Education, recommendations from a locally established Blue Ribbon Panel, and recognition of the fact that the existing mission statement had been in place for a decade, the Board of Trustees adopted a resolution in September 1992 authorizing the newly appointed president "to implement a process that [would] culminate in the submission of a draft revised mission statement to the Board no later than April, 1993" (Resolution 1992; Exhibit A).

Glen Gabert, who took office the same month as the Board of Trustees approved the resolution, chose the review of the mission as an opportunity for institutional renewal. In order to maximize the results of this process, a multi-faceted approach was taken. Although the process is not complete (i.e. the resulting mission statement is becoming internalized through the planning process and we continue to review and share feedback received during the review), over the past eleven months the following activities have been conducted. These activities not only resulted in a new mission statement in April but continue as a vehicle of institutional reappraisal and revitalization. At each step, a continual process of gathering, analyzing, and sharing information and then gathering, analyzing, and sharing feedback took place.

1. Review of Mission Statements from Other Comprehensive Community Colleges

The mission of the college had been a limited but evolving one, emphasizing programs preparing students for entering occupations. Transfer programs were only recently being phased in, and continuing education was limited. Therefore, it was determined that it was important to include an educational activity in which the college community could consider how other colleges conceived of their mission to their community.

During the period from October 1992 through January 1993, the Dean of Institutional Research and Planning selected a sample of 67 comprehensive community colleges in 22 states and gathered mission statements and mission-related documents from these colleges. The resulting documents came from 12 of the 19 community colleges in New Jersey (the home state with shared licensing authority) and 8 community colleges in New York (nearby and urban with shared accrediting affiliation). Beyond this, the criteria for selection included "comprehensive mission, diverse population in service area, and national reputation" (National Sample 1993, Introduction; Exhibit B).

The mission statements and related documents were gathered together in two volumes, photocopied, and placed in each of the different college locations.

It was noted in the document that the Monroe Community College (NY) mission statement

> provides an excellent set of questions we may wish to consider in the development of the mission statement for the new comprehensive Hudson County Community College. These questions are:
>
> Is the mission statement inclusive?
> Is the mission statement clear?
> Is it succinctly stated in language that all constituents can understand?
> Does it avoid jargon and cloudy rhetoric?
> Does it indicate aspirations that can be accomplished? Is it realistic?
> Can progress be adequately defined and assessed?
> Are the elements those for which the College wishes to be held accountable?
>
> We may wish to add the following question:
>
> Does the mission statement address the needs of Hudson County and of its residents?

College personnel were invited to study the mission statements during the months in which the review process took place. Once the first draft statement was circulated, college personnel were particularly invited to review these statements in preparation for an all day forum in February.

The invitation to members of the college community to review these documents put the word out that the mission review process was to be an open one: interest was generated. Many persons commented on how much they had learned from this review of the varied documents: the educational process was initiated. Faculty and staff began to envision new possibilities at Hudson County Community College: the revitalization of the college had begun.

2. Surveys of College and County Communities

Early on it was decided that it was important to be as inclusive as possible. A survey of the college community and of the county community was planned. Such a survey would serve not only to gather information and generate interest in the mission review, but it could also be used to further the educational process.

During November 1992 questionnaires relevant to a mission review were obtained from other colleges. A questionnaire obtained from Johnson County Community College (KS) was revised and distributed to over 1,100 persons which included all college employees and a sample of students (both part-time and full-time), alumni, and community leaders in business or industry, education, government, health and human services, and the legal, insurance, and real estate professions.

The questionnaires had three parts: (1) requests for ratings on the perceived importance of 33 possible functions, programs, or services the college could offer, (2) requests for demographic information, and (3) a request for responses to an open-ended item, "We would appreciate any comments you might have about Hudson County Community College". The two versions of the questionnaire drawn up for the college and county surveys were identical with the exception of a question regarding either college affiliation (e.g. student, faculty) or county occupational affiliation (e.g. business, education). (Exhibit C)

It was possible, from these items, to gather information not only about what respondents considered important to include in college's mission, but also to gather information about how the college was viewed and whether or not there was agreement among the various constituencies. Analysis of the responses resulted in three reports, the first of which reported the contributed comments from the college community; the second, the contributed comments from the county leaders; and the third, the comparative responses from both groups to the closed items (Mission Survey 1993; Exhibit D).

From the analysis of the responses, ten items were rated "quite" to "very important." These emphasized career oriented degree programs and services, transfer oriented degree programs, affordability and accessibility, centralized campus, comprehensive curriculum, and job training courses. The programs or services considered "least" important (even these items were ranked as "important") included providing access to facilities for community groups, sponsoring athletic teams, and bilingual instruction. It was found that there was a great deal of agreement between the college community and the external community as to the importance of the various programs or services, although most were considered more important by members of the college community.

This feedback from the college and county communities not only provided guidance in the drafting of the mission statement, but also served as a caution: two of the programs in which the college took great pride were among those with lower rankings. The athletic teams, even without facilities to practice, take regional and national championships, and the bilingual programs serve a large portion of the college enrollment. The dilemma then is whether or not the college will continue these programs; and, since it is quite likely that it will, the challenge is for the college to change perceptions about the importance of these programs.

The resulting reports from these surveys were circulated widely within the college, one has been submitted to ERIC, results have been shared at regional symposiums, and further analyses continue with results shared.

3. Review of College Background Documents

The College held an all-day forum to consider issues related to the mission, and this will be discussed later. Background documents were collected together and distributed to the participants so that they could fully prepare to take an active part in the forum. This was in addition to the two volumes of mission statements from other community colleges described earlier.

The documents included the following:

- Draft Revised Mission Statement Resolution of the College's Board of Trustees (September 21, 1992).
- Mission, Goals, and Objectives Statement from Characteristics of Excellence in Higher Education (1982). Commission on Higher Education, Middle States Association of Colleges and Schools.
- A comprehensive Urban Community College: A Vision for the Future (1991). Department of Higher Education, State of New Jersey.
- Philosophy, Mission and Goals Statement from Hudson County Community College, Master Plan, 1986-1991: A Strategic Vision (1986).
- Overview of National Sample of 67 Mission Statements from Comprehensive Community Colleges (1993). (Described in Step 1)
- Hudson County Community College Mission Survey Results (1993) (Reports Described in Step 2)

Together these documents provided a broad perspective: they included the college's own earlier plan, the vision of the state from which it was licensed, the model from the regional accrediting association, versions from other comprehensive community colleges, and the views of the community – both within and without the college.

4. All-Day Mission Forum

On February 27, 1993, an all-day forum was held at a hotel in the community (Exhibit F). Prior to the forum, all who accepted the invitation to attend were given the background documents (mentioned in Step 3) and a copy of the first draft of a possible mission statement.

In all, one-hundred college and county community members attended. College participants included students, alumni, faculty, administrators, board of trustee members, and members of the support, maintenance, and security staffs. Community members included representatives from business, industry, education, health and human services, community agencies, and the legal, real estate and insurance professions. The president of the nearby state college joined in the proceedings.

The president of the college and the Board of Trustee members took an active part in the forum. Louis Bender, Professor Emeritus of Higher Education at Florida State University and a national expert on community colleges, addressed the group and inspired and challenged participants to consider how the college could find and exploit a niche. The group then broke into six smaller focus groups to consider specific issues related to the college's future and mission. The groups purposefully included a mix of students, faculty, administrators, support staff, maintenance staff, security personnel, governing board members and community members. Individual college faculty, administrators, staff and students served as facilitators, resource persons, and recorders of each group. Following a shared luncheon, a reporter from each group presented a summary of the deliberations to the entire group; these reporters were often community representatives. Following the forum, the proceedings from each focus group were sent to all participants.

This activity generated a great deal of interaction among persons from both the college and the county community who otherwise did not have the opportunity to interact. Staff members, who might not otherwise have felt that their opinions mattered as to the future of the college, were heard; they were enthusiastic in sharing their opinions. And they were impressed that they were able to share their opinions in the forum as peers of such leaders as college presidents.

5. Mission Statement

A draft mission statement was drawn up based on activities through early February. As mentioned earlier it was shared with participants of the forum. It was also distributed to all employees for feedback. Following the forum and feedback from the college community, it was revised and in March 1993 shared a second time with the college community through publication in the employee newsletter, HCCC Network, and with the county community through letters to those who had earlier received the mission questionnaire. Again feedback was sought. This resulted in the inclusion of a general education goal statement.

The final mission statement was presented to the Board of Trustees who approved it at that body's April 1993 meeting (Exhibit G).

6. The Aftermath

Following the adoption of the revised mission statement, much activity has taken place which has been a natural outgrowth of the mission review.

- Short and long term planning has proceeded within the framework of the mission goal statements.
- A paper was prepared on the evolution of the college's mission from a limited mission to a comprehensive one; this paper was presented at a staff development seminar in September and at a symposium on urban education at Jersey City State College just a week ago.
- A paper was prepared on the community's perceptions of the college (as based on the mission survey); this paper was presented at a staff development seminar in October.
- A paper was prepared on the argument for the provision of developmental education as integral to the mission of the college; this paper was also presented at the symposium on urban education at Jersey City State College. We are considering writing such arguments for each goal of the mission statement.
- Institutional research articles concerning county demographics in the staff newspaper, HCCC Networks, have related the analysis to the goals of the mission statement.
- Articles and announcements are being prepared for submission to higher education, in particular community college, and planning and research publications.
- A one year review of the impact of the new mission statement will serve as the focus of a staff development day during the Spring 1994 semester.

And here and now, the process is being share with other professionals. The ripple effects from our mission review go on.

The resulting mission statement is but one outcome of this review process. A message of openness has gone out to the college community and the community at large. A vast amount of learning about the mission of community colleges, in particular the comprehensive urban community college, has taken place. Communication channels among members of the college community and between members of the college and county communities has helped to begin the process of dispelling old negative images about the college and generate new ideas for the development of programs and outreach programs in the community: community representatives have been pleased to observe the sense of momentum among college employees, and college employees have been heartened to realize the vast amount of goodwill and support the college has in the county.

Besides the positive momentum the process has given the college community, some lessons have been learned which offer future directions. Feedback from the survey and forum break out groups have presented some puzzles for the college which suggest either institutional change or a public relations campaign to educate the community. An example of this concerns our bilingual program. We are challenged to better explain the necessity of these programs. There seems often to be a misconception that somehow our non-English speaking population did not learn the English language as they should have in public schools; it is often forgotten that many of them came to Hudson County as adults and did not go through the educational system in the United States. This is but one example of what we learned from the survey.

Conclusion

Hudson County Community College has a new mission statement. The statement documents that the college has moved from a limited to a comprehensive mission. The statement symbolizes the expansion of the college in enrollment, programs, full-time faculty and facilities. It symbolizes a college moving away from its contracted instructional programs to independence. It symbolizes a college ready to more fully serve its community. It symbolizes a college on the move. The mission review can serve powerfully latent as well as manifest functions for a college.

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A Review of Reliability, Validity and Useability Considerations in the Use of the Writing Sample as an Index of Program Effect

Stanley S. Jacobs, Ph.D.
Office of Planning and Institutional Research
Villanova University
Villanova, Pennsylvania 19085

Mary Ann Ausetts, M.A.
Institute for Survey Research
Temple University
Philadelphia, PA 19122

INTRODUCTION

The origins of the competitive written examination may be traced to China's Sui dynasty, in the late sixth and early seventh centuries (Lederman, 1986). A number of writers have described procedures and problems characteristic of this period, which persist today (Anastasi, 1993). These include concerns that the form of the test was dictating the content and method of instruction (Fairbank, Reischauer & Craig, 1973), the influences of irrelevant variables on the assessment process (DuBois, 1970), and the temptation to cheat (Miyazaki, 1981).

The use of written examinations in western society may be traced to the European university. DuBois (1970) and Ebel (1972) document the evolution of the examination process, and the use of examinations in certification, evaluation and selection. The movement from an oral to a written process of examination, common by the thirteenth century, has a long history (Lunsford, 1986), and has not been without its skeptics. Despite the dependence of contemporary instruction in writing on the Greek tradition, especially Aristotle's approach to reasoning (Applebee, 1984), it is interesting to note that his mentor, Plato, was an outspoken critic of written discourse, regarding writing as both inferior to oral debate and, in fact, harmful to one's intellectual development. The debates concerning the relative merits of oral and written discourse have continued into the Twentieth Century (Lunsford, 1986), but were somewhat "derailed" by the rise of the "new type" or objective examination in the 1920s (Ruch, 1929). The adoption of the "objective" format, with its promise of efficiency, reliability and scientific rigor, was undoubtedly accelerated by a growing awareness and documentation of the difficulties inherent in the evaluation of written examinations (Starch and Elliot, 1912). The dispute evolved from the relative advantages of oral versus written discourse, to the relative advantages of written versus objectively-scored means of evaluation. Another positive influence on the growth of objective items and tests was the development of

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We would like to thank Eli Golblatt for his helpful commentary on a draft of this article.

commercial standardized tests based in whole or part on the objective format. The process is exemplified by the development of the Scholastic Aptitude Test (SAT) (Angoff & Dyer, 1971).

A number of events, documented and discussed by Haney (1984), and spanning the period from the mid-1950s to the late 1970s, led to both an explosive growth in testing and to critical attacks on the testing enterprise. During this period, attention was focused on standardized tests of the objective variety used in "high stakes" decision-making. The "war on testing" (Lerner, 1980) raged into the 1980s and finally seems to have diminished somewhat in intensity. It should be pointed out that the field of tests and measurements has had its share of "internal critics", many of them leaders in their respective fields (e.g., Dyer, 1977). Despite the huge success of standardized testing, and the growing popularity of objective tests for selection, evaluation and certification, there were indications that the isolation and esoteric nature of psychometrics was at least partly responsible for much of public hostility toward testing (Hoffman, 1962; Anastasi, 1967). In the same vein, Buros (1978) summarized the recent major changes in the measurement of achievement to be in the areas of test scoring, data analysis and reporting, and not in improved strategies for evaluation (p. 1972).

The 1970s and 1980s also brought the growing realization that there was an impending literacy crisis (Purnell, 1982). The apparent decline in reading, speaking and writing skills may have been partially created (or, perhaps revealed) by higher education's efforts to encourage and enable large numbers of "new students" to enter college in the late 1960s and early 1970s. The decline (usually in terms of standardized test scores) has resulted in both accrediting agencies and institutions emphasizing both instruction and improved evaluation in the communication skills of reading, writing and speaking.

The purpose of the present paper is to review the theoretical and empirical issues relevant to the evaluation of student writing abilities. The emphasis in the paper will be on the use of direct assessment (e.g. writing samples, essay tests) as opposed to indirect assessment (e.g. objective tests requiring error identification or correction; compliance with rules of grammar).

The more fundamental reason for the orientation and emphasis of the paper is the authors' conviction that most teachers of writing (and many critics of objective tests) are correct in their insistence that the selection of a correct option or answer on a multiple-choice item involves different skills, knowledge and behaviors than the process of planning, creating and revising a response to a prompt on an essay test. However, we are also convinced that both strategies for evaluating students play a critical role in the assessment of writing skill, beyond the often-repeated observation that there are modest correlations between the two types of data. As White (1986) so succinctly stated, "Different kinds of skills are most effectively measured by different kinds of tests" (p. 62).

THE DEBATE OVER INDIRECT VERSUS DIRECT MEANS OF ASSESSING WRITING ABILITY

Proponents of the indirect approach to the assessment of writing ability usually cite one or more of the following as advantages associated with this strategy:

1. There are definite time, cost and efficiency advantages in the use of objectively-scored tests when the group to be tested is large.
2. The scoring procedure is highly reliable.
3. The sampling of a domain of interest can be more thorough.
4. The evaluation of student responses is impartial.
5. The procedure is more responsive to pressure for prompt reporting of test results.
6. Test scoring can be accomplished by persons with no knowledge of test content.

Direct approaches are regarded as a more rigorous and intensive evaluation of student achievement, especially in the assessment of writing skills, and are alleged to have a beneficial effect on student learning. With respect to the evaluation of writing skills, the essay test possesses face validity, with at least the potential for high fidelity with a variety of real-life writing situations and demands (Stiggins, 1982), and appears to be an example of work - sample tests (Guion, 1979). However, as the Standards for Educational and Psychological Tests (American Psychological Association, 1974) points out

> *So-called face validity, the mere appearance of validity, is not an acceptable basis for interpretive inferences from test scores.* (p. 26)

Also, a close consideration of Guion's theoretical development reveals significant deficiencies in the typical essay test.

It is commonly accepted that essay tests typically provide limited sampling of student abilities, achievement or knowledge, they are time-consuming, expensive and difficult to grade reliably (i.e., requiring trained, knowledgeable raters), prevent prompt feedback to students, and are host to a number of other problems. However, the feeling persists that students do, in fact, learn from the writing experience. Schumacher and Nash (1991), state, for example, "...that writing is crucial for learning is a well-accepted fact in the education community" (p. 67). The data provided to support this statement are complex, confusing and incomplete. Probably Applebee's (1984) statement based on a comprehensive review of the research literature, that "... the relationship between writing and reasoning has been one of the unexamined assumptions in the study of writing instruction" (p. 590), is probably a more accurate description of our current state of knowledge concerning the relationship between writing and learning. Perhaps the central problem with most writing-to-learn research (indeed, most research on the evaluation of writing skills) is the atheoretic approach taken by most researchers, an approach that results in their finding that different tasks result in different kinds of cognitive operations that, in turn, result in different kinds of learning (Durst, 1987; Ackerman & Smith, 1988; Tierney, Sater, O'Flahavan, & McGinley, 1989). In the absence of theoretically-oriented research, studies appear fragmented, inferences are severely limited or qualified, and general principles are difficult to detect. As summarized by Newell and Winograd (1989), "...there is at present only a slender empirical base from which to conceptualize how ... the writing process and what writers take from writing are interrelated" (p. 196).

One of the most important conclusions that can be drawn from the literature concerning the relative advantages and disadvantages of direct and indirect assessment is that both approaches have the potential for contributing to our knowledge and understanding of student learning, retention, and achievement. Objective tests can be designed to systematically investigate the acquisition of fundamental skills and competencies (e.g., spelling, knowledge of conventions) that provide part of the foundation necessary to enable a student to write well (Conlan, 1986). Royer, Cisero and Carlo (1993) identify such measurements as useful indices of the extent to which learners have acquired skills and knowledge needed to function at the most basic stage of skill development. The empirical relationship between the mastery of basic skills and the demonstration of the advanced competencies (e.g., "good" writing) supposedly dependent upon them needs to be studied.

A common criticism of indirect assessment, as exemplified by the multiple-choice format, is that trivia is emphasized. This argument is usually based on the lack of face validity for the approach. However, as Matalene (1982) has demonstrated, objective tests can be developed to measure more complex cognitive skills and abilities.

Williams (1982) and Applebee (1984) have pointed out that the focus on trivial types of knowledge and skills seems to be a persistent problem in the direct approach to assessment as well. Schumacher and Nash (1991) comment that knowledge change, in both instruction and research, is often equated with knowledge accretion, the simple acquisition of facts. If one of the advantages of the direct approach to writing assessment is that students can reorganize and reconceptualize information, two requirements seem obvious. There should be a deliberate effort on the part of instruction to develop these abilities, and the evaluation procedure should provide the opportunity for their demonstration and assessment. Perhaps the trend toward "authentic assessment" (Wiggins, 1989; Adler, 1993); American College Testing Program, 1992) and portfolio assessment (Far West Laboratory, 1992) will accelerate these developments by revealing the deficiencies in our current approaches to assessment (and instruction).

"Authentic" approaches to assessment are generally regarded as requiring the following properties:

1. the assessments should utilize real settings, where possible;
2. the assessment should require the student to apply skills to the resolution of problems which are present both in and outside of the classroom;

3. the assessment procedure should be validated against relevant and significant criteria;

4. the measurement procedure should address central and significant issues, that are potentially of broad scope, complex and ill-defined, demanding the application of higher order cognitive skills;

5. the evaluative procedure should, in its own right, be a learning experience for the student.

A number of studies have demonstrated substantial correlations between indirect and direct measures of writing ability (Breland & Gaynor, 1979; Hogan & Mishler, 1980; Coffman, 1966). These studies typically focused on questions of "concurrent validity" (i.e., Can direct measures be replaced by indirect measures?) without considering the degree to which both measures were dependent on some common (third) variable. Huddleston (1954) demonstrated that both indirect and direct measures of writing ability may be somewhat imperfect indices of verbal ability, a possibility echoed by Breland and Gaynor. Bamberg (1982) reported a low correlation between direct and indirect measures of writing ability, and a high correlation between the indirect measure (objective test scores) and a measure of verbal ability. This pattern was interpreted as evidence for the lack of validity of the indirect measure and evidence for the validity of the direct approach. Obviously, there is some information missing -- the reliability of the direct data and its correlation with the measure of verbal ability. This is an area of inquiry that needs to be carefully studied. Finding no correlation between direct and indirect measures of writing ability provides a very tenuous basis for arguing for the validity of either (e.g. Sabban & Kay, 1987).

The questions of examiner and examinee preferences for indirect versus direct approaches to the assessment of writing ability has received little attention. Purnell (1982) found that about 80 percent of the college writing instructors who responded to national surveys in 1979 and 1981 reported that a direct approach to assessment was an integral and indispensable part of the assessment of writing proficiency. Zeidner (1987) investigated student perceptions of the relative merits of direct versus indirect measures among junior high school students in Israel. The results of two surveys indicated a strong preference for multiple-choice tests rather than essays. Despite this stated preference, students considered essays as somewhat more appropriate than multiple-choice exams for the purpose of reflecting one's knowledge in the subject matter tested. Zeidner's comments concerning possible relationships among attitudes, perceptions and preferences of students, and test-related behaviors (e.g., preparation, cooperation, performance) provide a number of avenues for further study.

THE USE OF DIRECT ASSESSMENT (THE WRITING SAMPLE) AS A MEASURE OF PROGRAM EFFECT

This portion of the review will focus on the relevant literature and research concerning the writing sample as a measurement procedure. The writing sample will be regarded as a special case of the more general approach to evaluation, the essay test. Although the interest in such a sample may be primarily in the writing abilities of students, with content of secondary concern, and the interest in the more general essay examination shared between writing skills and mastery of content, many, if not most, of the research issues and problems are the same. Therefore, the terms "writing sample" and "essay test" will be regarded as virtually synonymous.

Reliability Issues

The Sampling of Behavior

Concern is often expressed over the adequacy of the sampling of behavior from some real or hypothetical population. Limitations result from the amount of time required to respond to one or more "prompts" (i.e., stimuli) designed to elicit the response from the students. As an area of concern, one would classify this as a problem of test design. A moment's reflection will reveal that there is not one "population of interest", but many. As Odell and Cooper (1980) point out, current discourse theory assumes an ability on the part of the student to address diverse audiences, to accomplish varied objectives. Variations within task structure, such as discourse aim (e.g., Kinneavy's (1971) expressive, literary, persuasive or referential; Button's (1978) expressive, literary or transactional; Quellmalz's (1984) exposition, persuasion, narration and description), assigned topic, time allowed, the students' perceptions of their audience, as well as numerous other factors, taken singly or in various combinations, create a huge number of possible "populations of interest". Obviously, students cannot be adequately taught to function in all, nor do we possess the ability to assess their abilities to function in even a large number of them.

While concern over the adequacy of sampling is valid, there also must be an operational narrowing of the scope of instruction and assessment to enable both. We must also acknowledge that there are fundamental deficiencies in our knowledge of how many variables operate to effect student performance. As Hoetker (1982) points out, most instructors in writing feel that mode of discourse is somehow related to student performance. Not only are we unsure of how this occurs, but we cannot even adequately operationally define "mode of discourse". A full rhetorical context (as suggested by Quellmalz (1984)) should assist students but we are unsure of how to supply it. We do know that students often do not follow the instructions given, or even write on topics provided -- why? (Brossell & Ash, 1984, pp. 424-425).

Given that there are a large number of "populations of interest", it is a decision of both instructional and evaluation design as to the number and characteristics of the types of behavior which will be addressed. Assuming this design decision has been accomplished, one can turn his/her attention toward development of the prompts needed. Crocker (1987) offers a useful guide to their development, as well as to the entire process of developing an evaluative procedure for assessing writing skills. The technical manual for the Tests of General Educational Development (American Council on Education, 1993) also provides valuable guidance for prompt development, as well as evaluative procedures. Hoetker and Brossell (1986) offer a model for the development of essay examination topics that may be relatively content fair, considering the variation in the backgrounds, education and experience of students. The approach does not eliminate the problems associated with inferences based on small or varied samples of behavior, but may reduce the variability in students' behavior if it is due to a lack of equivalent familiarity with essay topics.

Teachers and evaluators often attempt to make the process of evaluation more equitable by allowing students a choice among essay topics. The most obvious problem with this approach is a lack of comparability in the data resulting from the procedure. If the topics are different, then the criteria for performance, the rating procedure, the "population of interest" and other relevant factors are different, preventing valid comparisons among students. Meyer (1939) demonstrated, too, that students cannot identify those topics upon which they will do best. A number of other variables may be involved in the selection procedure. As Wiseman and Wrigley (1958), demonstrated, the selection of specific topics by English school children was moderated by the ability level of the children. Although Wiseman and Wrigley state that allowing choice "...probably gives satisfaction to both teachers and pupils" (p. 138), the systematic effect of extraneous variables and their impact on the utility of student evaluations are usually important (Hilgers, 1982). The nature of the issues changes significantly, however, if student writing is viewed as a learning experience and not primarily as the basis for evaluation.

A related issue concerns the number of samples of behavior needed to achieve an acceptable level of reliability. As Guilford (1954) pointed out, the effect should be predictable with the Spearman-Brown formula, assuming the assumptions of the formula are satisfied (p. 397). Briefly, the formula estimates the effect on a reliability coefficient when the length of a test or number of raters is changed by some factor n, which can be a whole number or decimal value. Steele (1979) found that an optimal number of writing samples may be three, rated by two evaluators. This combination resulted in a "peaking" of reliability estimates. Further increases in the number of samples and raters resulted in relatively minor gains. Tillman, King and Michalczyk (1979) obtained similar results. Fader (1986) and White (1986) also recommend at least two independent readings of any sample.

Agreement of Raters

There are a number of ways to conceptualize the problem of rater reliability. One may be concerned with the agreement of raters with themselves (a "test-retest" paradigm), the agreement of a group of raters with each other (a "parallel forms" paradigm), and the agreement of raters (either paradigm) with repeated samples of student behavior from some population. Since there are different sources of measurement error in each research situation, the reliability estimates will differ.

Although concern is often voiced about the lack of reliability associated with essay-based data, reliability questions refer to data contaminated by random error. A close scrutiny of most investigations of the quality of essay-based data reveals a concern with systematic sources of variation in assigned scores. That is, systematic variations in some factors are associated with systematic changes or differences in the estimated quality (e.g., scores) of the data associated with that factor. These are validity questions since the influence is systematic as opposed to random.

With respect to reliability questions, the distinction should be drawn between reader consistency - i.e., the between-or-within--rater agreement in grading student products - and the reliability of the data generated by the examination itself. It has been repeatedly demonstrated (Ruch, 1929; Traxler & Anderson, 1935; Coffman, 1971) that agreement in grading essays is typically higher than the reliability of the test itself. In terms of obtaining data of acceptable quality (i.e., high reliability), it follows that the training of raters to a level of high inter- or intra-rater agreement is a necessary but not sufficient condition. Attention must be paid to the concerns set forth in Section 1., above, many of which represent efforts to reduce sources of error variance in the task set for the student (e.g., attempt to specify a full rhetorical context for the student). Other concerns represent attempts to increase the proportion of true score variance in the resulting data (e.g., increase the number of essays written, or the number of scoreable parts).

Strategies for Scoring Essays

There are several contemporary strategies for evaluating essays. Each will be briefly described, with its advantages and disadvantages.

Analytic Scoring

Analytic scoring is the practice of having each rater evaluate each essay using a list of specific scoreable features, with scoring values or weights for each. The approach can be traced to Diederich's (1974) evaluative scale, which considered the scoring of ideas, punctuation, organization, wording, flavor, usage, spelling and handwriting.

This approach may be somewhat time-consuming due to the number of evaluative decisions that are required. It also appears to have the promise of providing extensive diagnostic information of a highly reliable sort, due to the number of scoreable factors for a given essay. It also has the potential for focussing raters' attention on specific factors to be evaluated, rather than a global, general impression that might be swayed by irrelevancies or factors regarded as least important.

Holistic Scoring

The early development of holistic scoring occurred almost entirely under the auspices of the Educational Testing Service (White, 1985, p. 19). While sometimes referred to as "general impression" scoring, the procedure has evolved beyond the unguided, uncontrolled evaluative procedure Diederich (1974) reported in his earliest experiments. Employing a continuum of specificity, precision and variety of scoring criteria employed, analytic and holistic scoring are polar opposites.

Holistic scoring has the following features (White, 1984):

- The reading and evaluation of essays is strictly controlled and is implemented with a trained, highly cohesive group.
- A scoring guide, that is a direct statement of the characteristics of papers at various points on the scoring scale, is developed by those responsible for the evaluation, before the raters are assembled.

- Papers that are illustrative of the various points on the scale ("anchor papers") are selected, and are used in the training process to illustrate the abstract nature of the criteria in the scoring guide (sometimes called a "rubic"). (Daiker & Grogan, 1991).

- Constant supervision of small groups of raters is provided by "table leaders" who do not score papers, but monitor the process to ensure consistency.

- Multiple independent scorings are used to test for consistency and to identify problems (e.g., a consistently discrepant rater).

The reliability (degree of agreement among raters, or of raters with themselves) of holistic scoring has been reported to range as high as .70 to the .90s (Cooper & Odell, 1977, p. 3; Steele, 1979). However, a number of questions concerning the validity of the resulting data have been raised by researchers (Nagy, Evans & Robinson, 1988). The results of Myers, McConville and Coffman (1966) support Huddleston's (1954) conclusion that a general ability construct underlies the ranking of papers by the holistic scoring method. Their analysis produced factors that supported a general ability or general quality interpretation, that appeared to reflect dimensions other than simply content. Myers, et al. also demonstrated that properly trained and supervised raters using an holistic approach agreed quite closely on overall quality judgements, but that various attributes of a composition (e.g. spelling, grammar, organization) appeared to be differentially weighted. However, the respective attributes were consistently weighted across judges.

A finding of some importance was the dramatic decline in the reliability of judgements at the end of the rating process. The authors attribute the decline to fatigue, relief, and a resulting lack of attention or vigilance. The degree to which this is effected by the magnitude or duration of the evaluative task needs to be investigated.

In a discussion of Diederich's five factors of ideas, form, creativity, mechanics and wording, (Diederich, French & Carlton, 1961) and how these factors influence ratings , McColly (1970) points out that little more than a generalized halo effect may be reflected in ratings. Page's (1968) analysis of the Diederich factors might also be interpreted in this way. The intercorrelations among scores reflecting the five factors ranged from .65 to .89 (p. 92). However, one may argue that this is precisely the goal if a total, holistic score is to have meaning as an index of a unitary construct. Certainly, in developing a reliable index, one should strive for positively intercorrelated measures, each tapping a slightly different aspect of behavior. If the components are independent, the reliability will be low and the resulting composite score difficult if not impossible to interpret.

Steele (1985) cites a number of weaknesses in holistic scoring, including the fact that the ratings are not diagnostic. This may occur because the ratings are not designed to be diagnostic (only an overall rating is assigned), or because the components of the ratings are too highly interrelated to be regarded as having any discriminatory value. Quellmalz (1984) is particularly critical of this deficiency in holistic scoring, citing the effects of a lack of specificity and informative feedback on student learning. As she points out, it seems inconsistent that an evaluative procedure fails to provide the same level of support for judgements that we expect students to offer in support of the views expressed in their essays (p. 67).

Holistic scoring is undoubtedly efficient in terms of accomplishing the task of evaluating essays. Quellmalz cites a study that demonstrates the difference between analytic scoring and holistic scoring of a group of essays to average about one minute. Wiseman (1956) also points out that holistic scoring proceeds at a rate about four times faster than graders following an analytic schedule.

Efficiency, and indeed reliability, are both important concerns, but secondary to questions of validity. Charney (1984) has provided a thoughtful examination of the question of validity of holistic scores, pointing out that the reliability of holistically-scored data may be more perceptual than real. Salient but superficial aspects of student writing (e.g. length of the sample, handwriting legibility, spelling errors) may inflate the level of agreement among raters. Barritt, Stock and Clark (1986) document a number of problems leading to both "false consistency", or agreements due to irrelevant factors, and to inconsistency, such as highly idiosyncratic evaluative criteria and procedures. Holistic scoring has the potential for controlling both types or sources of error.

Huot (1990) summarized the problems often mentioned as characteristic of holistic scores as:

1. their correlation with irrelevant factors, such as appearance and length of essay (Markham, 1976);

2. a lack of diagnostic information concerning the qualities of student writing or instructional effects (Faigley, Cherry, Jollife, & Skinner, 1985; Odell & Cooper, 1980);

3. the norm-referenced nature of holistic scores (White, 1985); and

4. the nature of the training process and the evaluative procedure, that distorts the rating process, substituting speed (and superficial consistency) for a thoughtful evaluation.

Primary Trait Scoring

Primary Trait Scoring was developed for evaluating essays produced in response to the 1974 writing assessment of the National Assessment of Educational Progress (Lloyd-Jones, 1977). Unlike holistic approaches or the analytic approach, Primary Trait Scoring begins, not with an analysis of specific papers, but with an analysis of the assignment that prompted the writing. The rhetorical context for the writing, the intended audience and its nature, and the purpose of the writing are established. The writing task is analyzed, in order to determine the strategies important to accomplishing the task.

As a result of this analysis of task performance requirements a set of traits, or characteristics, which appear appropriate to the task is formulated. The papers are evaluated against a set of criteria, and not simply compared with each other.

An important consequence of this approach is that different tasks and different writing samples must be judged by different criteria. Lloyd-Jones explicitly rejects the notion that "writing is writing", and that criteria such as quality of ideas, organization, etc. have broad applicability across all types of writing (Foley, 1971, p. 803; Odell & Cooper, 1980, p. 40). Writing ability means the ability to address diverse audiences for diverse purposes. Consequently, many and varied samples of different types of writing are required for the adequate assessment of an individual -- there can be no comprehensive understanding of a person's writing ability if only one sample or even a small number of samples is available.

Primary Trait Scoring appears to have the promise of delivering sophisticated diagnostic information concerning student abilities and/or the effects of instruction. Royer, Cisero and Carlo (1993) point out in the context of cognitively-oriented instructional systems:

> *...a cognitive task analysis should be conducted before an attempt is made to train a cognitive skill, and it should certainly precede any effort to measure the acquisition of a cognitive skill"* (p. 208)

As most instructional theorists insist, assessment in a cognitively-oriented instructional system must provide diagnostic information and not merely the success or failure of a particular instructional event. Information must be available to evaluate the reasons for success or failure and to enable a plan to overcome deficiencies in learners. It is assumed that a typology of errors can be constructed, where certain types of errors are indicative of certain weaknesses for which particular types of instructional events can be prescribed.

Although Primary Trait Scoring is relatively demanding of examiners, requiring a substantial commitment of time and effort both prior to and following the collection of writing samples, it appears to have the greatest potential for producing valid, informative data concerning student abilities and the effects of instruction.

Other Approaches

The preceding three methodologies are the most commonly encountered, with holistic scoring by far the most popular. There have been other approaches to the evaluation of written work, however, such as Page's (1966, 1968) attempt to evaluate essays via computers. The orientation of most of these other strategies have been toward research rather than informative feedback useful to students and instructors.

A largely unresolved research question concerns the degree to which the different approaches to the evaluation of writing are sensitive to different aspects of performance. At the most basic level, one might determine the intercorrelation of scores resulting from several scorings of a common set of essays. Brossell (1986) cites a study by Winters which compared four essay scoring systems including general impression and analytic approaches. It was found that, although the four systems produced reliable data, different systems produced different patterns of results with groups which varied by level of maturity and ability.

Given the objectives of instruction and evaluation, one approach may be more desirable than another, but it also appears the decision will effect the nature of the data obtained from the evaluation, and actions taken on the basis of that information.

Systematic Effects on Essay Grading

Systematic effects are conceptualized as those factors that can be consistently shown to effect the evaluation of essays, by either spuriously raising or depressing the rating or score assigned to a specific essay or type of essay. These are considered to be problems with the validity of the resulting data, since there is some definite probability associated with a particular type of error, rather than uncertainty about the sign and magnitude of error, as is the case when reliability is a primary concern. The following are some of the factors that have been shown consistently to effect the evaluations of essays.

The Effects of Handwriting

Chase (1968) demonstrated that the quality of handwriting and essay grades were correlated by requiring raters to evaluate essays that were identical in every respect save penmanship. Hughes, Keeling and Tuck (1983) obtained similar results, and also found induced expectancies concerning student abilities had a significant effect (elevation and depression) on assigned essay grades. Chase (1979, 1990) however, found when teachers were given positive expectancies concerning student abilities, those essays written in a poor hand were rated higher than those written in a good hand. These results do not necessarily contradict those of Hughes, Keeling and Tuck, but may simply reflect a generalized "halo effect", or the tendency to give ostensibly good students the benefit of the doubt when unable to easily read and understand their work. Another possibility is rater over-compensation for the negative affect created by the task difficulty associated with reading papers written in a poor hand.

A number of writers (e.g. McColly, 1970) have posited handwriting quality as one of the principal extraneous factors responsible for the reported high reliabilities of holistically-scored essays. The obvious solution to this problem is to remove the source of variance, by either re-typing essays prior to evaluation or requiring them to be typed when submitted. There are obvious problems with either approach. The problem may disappear with the growing availability of word processors and printers, or may evolve to investigations concerning the effects of type face, pitch, ribbon quality and other variables that impact the reader of typed material.

Order or Context Effects

Context effects refer to the influence of preceding essays, of greater or lesser quality, on the evaluation of a given essay in a series being evaluated. Coffman and Kufman (1968) and Klein and Hart (1968) failed to find significant context effects. However, a number of studies, summarized in Hughes and Keeling (1984), have demonstrated the occurrence of context effects in the grading of essays. Typically, if an essay is preceded by an inferior example, it is rated higher than if preceded by a superior example. These results are quite consistent (Daly & Dickson-Markham, 1982; Hales & Tokar, 1975), even when raters were specifically warned of the existence, nature and operation of the effect. (Hughes, Keeling & Tuck 1980, 1986). Hughes and Keeling (1984) attempted to prevent the operation of context effects by providing graders with model essays to which they could refer during the grading process, but even this strategy failed to prevent context effects.

In large scale assessments, the only possible means to reduce context effects may be multiple readings, with papers randomly reordered between readings and the final score an average or simple sum of ratings. Context effects would likely persist within ratings, but could be expected to diminish across rating events in the summing or averaging process. Basically, an attempt would be made to change a systematic effect into a random effect.

Attention to some of the basic notions concerning the administration and scoring of essay tests (e.g., blind scoring to reduce "halo effects"), as recommended in standard references (e.g., Gronlund, 1985; Wiersma & Jurs, 1985), and summarized by Coker, Kolstad and Sosa (1988) may be utilized to alleviate some of the problems identified by Hughes and Keeling.

Topic Familiarity

Another concern often voiced (Hilgers, 1982) is students' relative familiarity with the topic(s) involved in the essay prompt. In addition, as Hoetker (1982) points out, the "mode" of writing called for by any essay topic is "...precisely that mode that any particular student interprets it as calling for." (p. 379). To further complicate the situation, any particular student may not be able to or may not care to write in the mode he or she interprets a topic to be calling for, or on the topic involved in the prompt. In a closely-related study, Brossell and Ash (1984) found that systematic variations in the wording of topics and the charge to students failed to effect writers or the holistic ratings assigned their essays.

However, within any group of students, variation in topic familiarity may interact with other aspects of the evaluative situation to produce complex interactions with factors such as student characteristics (Smith, et al. 1985). Steps should be taken to minimize topic familiarity as an extraneous source of variance in performance. Hoetker and Brossell (1986, 1989) describe a method for developing "content fair" essay topics for the evaluation of college-age students, and report research evidence that the approach minimizes the problem of content familiarity.

Their approach employs a model that stipulates the general task for the student. The student supplies the specific subject to be the focus of the essay, as well as any specific definitions involved, such as "significant effect". An example of a topic form might be

> A book that many students read that may affect them positively

A student would supply the name of a specific book. As Hoetker and

Brossell emphasize, the procedure is intended to produce content-fair topics which are not content-free. The test developer is still responsible for exercising judgement concerning the adequacy of "frames" or models for topics, as well as the resulting topics, considering the nature of the students involved.

Length of Response

Bracht and Hopkins (1968), Klein and Hart (1968), Garber (1967), Grobe (1981) and Lonka and Mikkonen (1989) found that the length of response correlated substantially with the rating assigned. However, Bracht and Hopkins (1968) found no relationship between length of writing sample and an independent measure, a test covering the same material. This result suggests that those who wrote more did not necessarily know more.

Lonka and Mikkonen hypothesize that the length of a writing sample may be a function of the extent of elaboration in a student's response rather than a function of the simple recall and reproduction of discrete factual information. There is support for this notion in the work begun by Page (1966) concerning the structural analysis of essays. Further support may be found in Malgady and Barcher's (1977) investigation of creativity judgments. These researchers found that the number and the novelty of sentences were both directly related to creativity ratings of a set of essays.

If holistic ratings (or any other type of rating) are significantly effected by perceived creativity, then the relationship between length, as an index for creativity or quality, and positive ratings is understandable. This interpretation is consistent with Grobe's (1981) study of compositions produced by fifth, eight and eleventh grade students. Grobe found that longer compositions that were free of mechanical errors (especially spelling mistakes) were assigned higher grades. A secondary analysis indicated that the total number of different words in a composition, potentially reflecting fluency, verbal ability or creativity, rather than simple length, predicted essay ratings.

The Influence of Content

A number of studies have indicated that in evaluative situations which are designed to focus raters' attention on content and organization, extraneous factors, such as mechanical features of student writing, are relatively unimportant sources of variance.

However, in a relatively uncontrolled evaluation of over 200 essays rated by ten evaluators, Remondino (1959) obtained four factors in an analysis of the ratings:

1. graphic representation (the physical appearance of the paper);
2. language usage (e.g. spelling, grammar);
3. content and organization; and
4. originality, creativity and imagination.

The four factors, which are listed in descending order in terms of variance accounted for, are ranked contrary to the order most instructors or evaluators would assign on the basis of relevance or importance.

Remondino's first two factors are typical of the type described by Charney (1984) and Freedman (1979), which may act to spuriously inflate the reliability of holistic ratings.

Diederich, French and Carlton (1961), in a more controlled study, found ideas, form, flavor, mechanics and wording (in that order) were the primary influences on raters' judgements. Similarly, Freedman (1979), Boodoo and Garlinghouse (1983) and Breland and Jones (1984) found content and organization to be primary influences. Rafoth and Rubin (1984) concluded that mechanics appeared to exert a stronger influence on judges' ratings than did content. However, the judges in their study appeared unable to distinguish clearly between content and mechanics, and the authors hypothesize that a "diffuse reaction" to one factor may have had an influence on the effects of the second. Chase (1986) reported complex interactions of extraneous variables in the rating situation, potentially indicating that content may play a minor role in determining essay grades in some situations (Rafoth & Rubin, 1984). "Blind scoring" will eliminate many of the potential sources of bias (e.g. gender, ethnicity, family name) that result in complex interactions of the type reported by Chase. A fruitful approach to exploring the evaluative processes employed by raters may be protocol analysis or a "think-aloud" approach (Vaughan, 1987).

Other Factors Influencing Ratings

Studies have repeatedly demonstrated that readers of essays are unable to rate responses independently of errors in spelling, punctuation and grammar (Scannell & Marshall, 1966; Marshall, 1967; Marshall & Powers, 1969). As pointed out earlier, these skills or knowledge of convention may be regarded by raters as basic to the act of composition and raters may over-react to these errors in a writing sample. The presence of these errors may also create systematic difficulties in reading and evaluating the essay, leading to a systematic relationship between reading ease and assigned scores (Chase, 1983).

Brown (1986) describes a study done at the University of Houston which demonstrated systematic differences in the writing patterns of black and white students. Black students used over four times as many quotes and misquotes, biblical references, metaphors, proverbs, maxims, cliches and other distinct features as whites.

If dialectic features influence holistic scores, by effecting readers' general impressions of quality, then a systematic effect on student scores will result. The nature of the raters charged with the evaluation of written work is an important part of the entire process. Although rater variation may be minimized through selection, training and close supervision, the possibility exists that certain rater characteristics may interact with the rating process to have a systematic influence on the resulting ratings.

Townsend, Kek and Tuck (1988), for example, investigated the influence of raters' mood on assigned ratings. Despite evidence that the ratings were completed reliably, and that the variable of mood was manipulated, there was no evidence of a systematic effect on ratings.

Branthwaite, Trueman and Berrisford (1981), however, found a significant association between personality (as operationalized by a questionnaire) and marks awarded an essay. This may illustrate the relative importance of "state" versus "trait" variables in the evaluative process.

Some Factors Influencing Performance

Torrance, Thomas and Robinson (1991) found that 86 percent of their research participants (secondary school students) believed that the best method for producing a written essay was to first develop a written plan. However, data indicated no significant association between the grade awarded and plan writing, plan type or the student's reason for planning. Soltis and Walberg (1989) found that those teen-aged students who reported engaging in prior planning of essays or in substantial revision of written work had lower levels of achievement than those who did not. The nature of the prior planning or revision, and the degree to with which it was beneficial to the final product were not determined.

The development of a written plan seems to assume a linear process in writing. Perhaps a recursive model, as proposed by Flower and Hayes (1981), is more consistent with the demands of the writing task, with the development of the plan and the actual writing two marginally-related behaviors. As Bartholomae (1980) demonstrated, students will often spontaneously correct errors in their written prose as they read it, unaware of the errors and unable to detect them.

As Soltis and Walberg point out, in contrast to original composition, revision receives little time or attention in the writing curriculum or in the process of evaluation. Students often do not revise work, but discard it and write an entirely new piece, in need of as much revision as the original. Students may perceive the task of revision as an attempt to adhere to "convention" (e.g., spelling, sentence structure) rather than focusing on a more effective means of expressing themselves. An important finding reported by Soltis and Walberg (1989), supporting the results of Karegianes, Pascarella and Pflaum (1980), was that peer feedback and discussion of written work was associated with enhanced levels of achievement. Given the repeated accusation in the literature that teacher comments are scanty, uninformative and rarely considered in re-evaluation of student work, peer discussion and feedback for the purposes of revision as an evaluative strategy may be an efficient and powerful means of both engaging students and improving the quality of their writing.

Summary

The conclusions one reaches after a consideration of the theoretical and empirical work on the assessment of writing ability depend to a large extent upon one's initial position and sentiments concerning the central issues. Certainly, research would be more fruitful if cast within a theory of composition. Short of a fully-developed theory to guide studies in the area, perhaps the most incisive approach to evaluation is to employ Lloyd-Jones' Primary Trait Scoring procedure. Holistic scoring seems to be a highly questionable process, despite producing apparently reliable data. Analytic scoring seems to require excessive time to employ, although the procedure appears to be capable of providing diagnostic information.

If one accepts the idea that indirect measures of relevant basic skills (e.g. spelling, mechanics, error identification and correction) can predict the performance of higher-order behaviors best assessed through direct measures, then the value of both indirect and direct assessment of writing ability is indisputable. The correlation between direct and indirect measures and the resultant arguments concerning the primacy of either assume a more appropriate perspective.

Writers who focus on the problems of evaluating essays have often noted that individual raters have to make a serious effort to reconcile philosophic differences in order to reach consensus. As Daiker and Grogan (1991) point out, reaching consensus always means the suppression or exclusion of some point of view. Without a common perspective concerning the basis for evaluation, the likelihood exists that individual raters are attending to different aspects of student performance and weighing the information in a highly idiosyncratic fashion. Such a process will never result in acceptable inter-rater agreement concerning the evaluation of student writing. This will be especially true if raters' attention is directed to specific features of written work, rather than a global impression which may be effected by extraneous factors. Some restriction in the generalizability of the resulting data can be expected, because of the limits inherent in, or placed upon, the work of a focused, consistent group of raters, but limited valid inferences are preferred over invalid conclusions, or worse, none at all due to the unreliability of data.

A number of research questions, especially those considering the cognitive process of composition, are deserving of intensive attention. As Facione (1990) pointed out in a consideration of the advantages and disadvantages of essay and objective approaches to assessment:

> "*...the essay omits claims considered and judged irrelevant, arguments evaluated as not of sufficient significance to the issues at hand to warrant mention, evidence queried but not used in the final form of the essay, alternatives conjectured but ultimately abandoned, and conclusions drawn but ultimately reconsidered and disregarded.*" (p.7)

These deficiencies in our attempts at product evaluation are representative of the types of research questions that bear directly on the supposed superiority of direct methods of assessment, especially their effects on learning. Another approach to evaluation, more pragmatic, is portfolio assessment. Certainly, a reconceptualization of how writing samples are produced, revised and evaluated is needed for their inclusion in student portfolios, (Far West Laboratory, 1992), but this appears to be a fruitful approach. The few studies that have appeared showing strong, positive effects of peer evaluation, guidance and feedback should be continued. As mentioned by Adler (1993), the trend toward "authentic assessment" and portfolio-based evaluation will require a re-thinking of the classic conceptualizations of reliability and validity.

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DEVELOPING CONSISTENCY DATA FOR THE ASQ PLUS

Ellen Armstrong Kanarek
Program Director
Applied Educational Research
100 Thanet Circle
Princeton, NJ 08540
609-924-0464

The Admitted Student Questionnaire (ASQ) program was developed by the College Board in 1988 to offer colleges the opportunity to conduct college choice research on their admitted freshmen. The ASQ asks students to consider 20 college characteristics, to indicate how important each was in their decision, and how the client college (the college sending them the questionnaire) rated in comparison to the set of other colleges they seriously considered. The survey also covers sources of information about the college, perceived images of it, financial aid and cost, and demographic information. In addition, the ASQ asks students to list up to six other colleges to which they applied, providing the client college with valuable information on application and admission overlap.

While the ASQ thus offers the client colleges a good view of the broad context within which their admitted students are making a college choice, many colleges wished to take the analyses a step further in order to understand the processes by which students choose between them and specific other colleges. In 1992 the College Board added to the ASQ program the Admitted Student Questionnaire Plus (Plus) to try to meet this need. The Plus covers the same topics, but instead of asking for comparative ratings (from Worst to Best) of the client college, it asks that students rate the client college and up to two other colleges, specified by the respondent on an absolute scale (from Poor/Fair to Excellent).

Because it is always clear on the Plus which colleges the student is rating, this instrument offers a unique opportunity to examine the consistency of student ratings across questionnaires, that is, when the student completes a questionnaire from two or more client colleges and rates the same college or colleges on each survey. This paper describes the methods used to identify the students completing more than one questionnaire, to build the data file, to choose appropriate comparisons, and to analyze the data.

Description of the ASQ Plus instrument

The ASQ Plus is comprised of seven sections: respondents are asked to 1) mark how important each of 16 college characteristics was in their college choice; 2) provide information on the colleges they applied to, including the names of their first, second and third choice colleges; 3) rate the client college (CC; called "Our college" on the questionnaire) and up to two other colleges (which they name as College A and College B) on the same 16 characteristics; 4) circle, from a list of 20, the words or phrases which they believe to be widely-held images of CC and colleges A and B; 5) rate CC and colleges A and B on the quality of information about the college provided by 12 different sources; 6) indicate their financial aid status at and rate the cost of attending CC and colleges A and B; and 7) provide descriptive information about themselves (gender, test scores, income, etc.).

For the third, fourth, fifth, and sixth sections, described above, the respondents are asked to provide three ratings -- of CC and colleges A and B. They are also asked to write in, for each section, the name of the college being rated therein, and are specifically instructed to "Please continue to rate the same colleges as A and B throughout the questionnaire." Almost all students do follow that last instruction, but there are a few who switch colleges A and B for one or more sections, or who leave one or more sections blank for either or both colleges. A handful of students also rate completely different colleges in one or more sections. Because the college being rated in each section is specifically keyed along with the ratings, it is possible to use all the data, even when the student has failed to follow directions.

Methodology

The project encompasses four major steps: 1) identifying the students who rated the same college(s) on more than one questionnaire; 2) creating a single data file from the multiple questionnaires; 3) setting up comparisons that were appropriate to the nature and structure of the data; and 4) identifying statistical analyses that were also appropriate, given the restricted range of the data. This paper will focus on the first three steps: the small number of matched cases available in this preliminary study (q.v.) makes detailed statistical analysis tantalizing but inconclusive.

1. Identifying the sample.

Colleges participating in the ASQ Plus (or the ASQ) have the option of placing some kind of an identification code on their surveys. This allows them to match ASQ data to institutional data for additional analyses. Questionnaires can only be matched across colleges if the same IDs are used by each college (or if the colleges are able to provide conversions of their unique IDs to some common form). Social Security Number (SSN) seemed to offer the best possibilities as common IDs, and questionnaires from the 1992 Plus studies were searched for nine-digit numbers that could be assumed to be SSNs. The results are as follows:

-- Of the 82 participating colleges, covering approximately 62,000 respondents, 54 colleges (approximately 43,000 students) used some kind of ID number on their questionnaire.

-- Of those, 14 colleges (comprising 15,000 respondents) used a nine-digit number, that was assumed to be an SSN after suspicious-looking numbers (such as those beginning with several 0's) were eliminated.

-- Of those 15,000 nine-digit numbers, 393 were duplicates: 195 numbers appeared twice, and one appeared three times. In the latter case, only two questionnaires were used in the analysis, those being the most complete data.

It was actually not surprising that the number of duplicates was small in this preliminary study, because the 14 colleges represented the entire spectrum of American higher education, including both public and private colleges, large and small, highly selective and less selective, two-year and four-year, liberal arts and business.[1]

2. Creating the data file.

The methods used to create the data file were fairly primitive and cumbersome! The original Plus data file of over 62,000 cases was reduced to 15,000 by selecting only the 14 colleges using a nine-digit ID (using SPSS-PC+; a college is identified in the data file by the four-digit code assigned to it by the College Board). A frequency count of the ID field revealed the

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[1] An independent estimation of the likelihood of duplicates can be made from an examination of the colleges admitted to by the respondents from each participating college, in order to determine whether other Plus users appeared among the colleges listed most frequently.

196 ID numbers that had a frequency greater than 1. (This was further complicated by the fact that one of the colleges had added one letter to the end of the ID field, necessitating the conversion of this field from alphanumeric to numeric before the IDs could be matched.)

An SPSS SELECT IF command extracted the desired 196 IDs, then one file of 196 cases was created from the 392 questionnaire records by treating the second questionnaire as the second record for each case. (The designation of "first" and "second" referred strictly to the order in which they appeared in the file, and had no reference at all to the identity of the college mailing either survey.) Elimination of duplicates (where there were two questionnaires for a single student from the same college[2]) and questionnaires that had no colleges rated in common, further reduced the matched sample to 135.[3]

The variables to be compared include:

-- importance and quality ratings of 13 college characteristics[4]
-- a marked/not marked flag for each of 14 college images
-- quality ratings of 12 sources of information about the college
-- a 1-8 rating of the cost of attending the college

It is also possible to examine whether the respondent listed the same three colleges on both questionnaires, in the same order, as his/her top three choices, but that discussion will not be included in this paper.

3. Establishing comparison sets.

Identifying the comparisons that could be made from this data set was the most difficult part of the study, because of the different combinations of data available. For each case (each student) there were six possible sets of ratings: on each of the two questionnaires there were ratings of "our college" (the CC that had mailed the survey) and two other colleges named by the student, referred to on the questionnaire as Colleges A and B. The college named and rated as College A was frequently the college to be attended by a student who would not matriculate at CC, or the second choice of a matriculating student. The basic task was to derive a streamlined set of matched ratings from all the possible combinations.

Since the college that mailed the first questionnaire (CC1) was always different from the college mailing the second questionnaire (CC2), the two records never contained data for the same colleges located in exactly the same fields. They could, however, contain ratings of the same colleges located in different fields. Some of the possible combinations are described below.

a) **CC1 was coded as College A or College B on the second questionnaire (CollA2 or CollB2, respectively).** For cases falling into this category, the ratings of CC1 would be compared to a new set of ratings consisting of the ratings of either CollA2 or CollB2, which represent the same college rated as CC1. The original layout would appear as follows. (This and subsequent examples use fictitious college codes.)

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[2] Participating colleges are presumed to have cleaned up their data and eliminated duplicate questionnaires before transmitting everything for processing. Applied Educational Research does not search for and eliminate duplicate records unless requested to do so by the participant. Comparison of duplicate questionnaires from the same college would make an interesting study in itself.

[3] Because of the large number of variables to be examined, and the convoluted nature of the process, SPSS for Windows was used for all subsequent procedures.

[4] The first 13 characteristics shown on the questionnaire, and the first 14 images listed, are common to all Plus questionnaires. Characteristics 14-16 and the 15th-19th images are chosen by each college and are disregarded here.

Case 1: CC1: 2222 CollA1: xxxx CollB1: xxxx
CC2: xxxx CollA2: 2222 CollB2: xxxx

Case 2: CC1: 2222 CollA1: xxxx CollB1: xxxx
CC2: xxxx CollA2: xxxx CollB2: 2222

For this category, the identity of the colleges in the other positions was irrelevant. The question of interest here was, "With which ratings on the second questionnaire should CC1 be compared?"

b) **CC2 was coded as College A or B on the first questionnaire (CollA1 or CollB1).** This situation is similar to the first in that the CC on one of the questionnaires is rated as College A or B on the other, but the two did not always occur together. For example:

Case 1: CC1: 2222 CollA1: 3333 CollB1: xxxx
CC2: 3333 CollA2: xxxx CollB2: 2222

Case 2: CC1: xxxx CollA1: xxxx CollB1: 3333
CC2: 3333 CollA2: xxxx CollB2: xxxx

These two situations represented the same type of comparison (CC on one questionnaire was rated as College A or B on the other). Because they could both exist for the same respondent, however, the ratings described in (b) were used to supplement, but not substitute for, those used in (a).

c) **Colleges A and/or B were rated on both questionnaires** (independent of which colleges were rated as CCs). For example:

Case 1: CC1: xxxx CollA1: 2222 CollB1: 3333
CC2: xxxx CollA2: 2222 CollB2: 3333

Case 2: CC1: xxxx CollA1: 2222 CollB1: 3333
CC2: xxxx CollA2: 3333 CollB2: 2222

Case 3: CC1: xxxx CollA1: xxxx CollB1: 2222
CC2: xxxx CollA2: 2222 CollB2: xxxx

For 35 of the cases (26%) all three colleges rated on one questionnaire were rated on the other. For another 41 (30%), one of the CCs was rated along with a different College A or B. The largest group (47, or 35%) rated Colleges A and/or B on both questionnaires, but neither of the CC's. The remaining 12 cases (9%) had one or both CCs in common, but no other colleges. The following comparison also illustrates the amount of overlap among the categories and the difficulties involved in matching the ratings correctly:

a)	CC1 = Coll2A	37	(27%)
b)	CC1 = Coll2B	28	(21%)
c)	CC2 = Coll1A	48	(36%)
d)	CC2 = Coll1B	22	(16%)
e)	Coll1A = Coll2B	1	(1%)
f)	Coll1B = Coll2A	3	(2%)
g)	Coll1A = Coll2A	4	(3%)
h)	Coll1B = Coll2B	39	(29%)

Groups (e), (f), and (g) were small because most of the matches involving College A occurred in groups (a) and (c).

For each section of the questionnaire eight sets of ratings were created. (For the importance ratings, which were independent of the colleges rated, only two sets were created -- one for each questionnaire): (1) ratings of the college listed as CC on the first questionnaire; (2) ratings of the same college when it was either College A or College B on the second questionnaire; (3) ratings of the college listed as CC on the second questionnaire; (4) ratings of that college when it was either College A or College B on the first questionnaire; (5) ratings of a college that appeared as College A on the first questionnaire and as College A or B on the second survey; (6) ratings of the same college from the second questionnaire; (7) ratings of the college that appeared as College B on the first questionnaire; and (8) ratings of that college from the second questionnaire.

Ratings of types (1) and (2) apply to comparison categories (a) and (b), described above. Similarly, ratings (3) and (4) apply to (c) and (d). Ratings (5) and (6) represent categories (e) and (g), while ratings (7) and (8) refer to (f) and (h).

Because most respondents had more than one set of ratings, another data file was created which contained one record for each of the four possible sets. Specifically, the first of the four records contained ratings of a college appearing as both CC1 and Coll2A/Coll2B; the second record contained the ratings of any college appearing as both CC2 and Coll1A/Coll1b; the third held ratings of a college appearing as Coll1A and Coll2A/Coll2B; and the fourth dealt with a college appearing as Coll1B and Coll2A/Coll2B. Any given respondent would have data for at most three of these sets, since only three colleges were rated per questionnaire.

Results

Once the myriad data transformations had been completed, it was possible to conduct some preliminary analyses. Obviously, the small number of duplicate cases available (370 records used out of a total of over 62,000) would make it ludicrous to draw any conclusions from the analyses. The results described here, however, will help to frame the questions asked in a more complete version of the study to be conducted early in 1994.

Given that the overall question is whether -- and to what extent -- a student's ratings of colleges on the ASQ Plus are consistent from one questionnaire to another, more specific research questions deal with the individual sections of the questionnaire and with the type of comparison being made:

- Is the importance ascribed to the college characteristics the same on both questionnaires?[5]
- Are the ratings of the quality of the characteristics and the quality of information provided at a given college consistent across questionnaires?
- Do the ratings of a given college tend to be higher if that college is rated as CC? In other words, is there any tendency for respondents to inflate ratings of the college asking the questions?
- Do the respondents mark the same images of the colleges on both questionnaires?
- Is the cost of attending the college rated the same both times?

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[5] It is assumed here that the importance of the characteristics in the college choice decision is independent of which college is asking the question, but it is possible to construct circumstances under which that would not be true. If, for example, a student were admitted to 10 colleges, Part of the Country might be important in eliminating five of the choices. Cost or Academic Reputation might then become more important in deciding between the remaining five.

Table 1 compares the two importance ratings of the 13 college characteristics, which are listed in the order given on the questionnaire. Only two of the differences are statistically significant, but the ratings of all characteristics are significantly correlated. The highest correlation is between the two importance ratings of Cost of Attendance. Note that all 13 characteristics are considered at least somewhat important on the average (mean rating > 2.0).

Table 1
Comparison of Importance Ratings

Characteristic	**Mean1**	**Mean2**	**Difference**	**Corr**
Academic reputation	2.79	2.85	-.0579 *	.710 **
Availability of majors	2.69	2.73	-.0373	.701 **
Special academic programs	2.26	2.21	.0522	.554 **
Personal attention	2.74	2.75	-.0075	.513 **
Academic facilities	2.61	2.67	-.0602	.485 **
Recreational facilities	2.41	2.49	-.0746	.542 **
Quality of campus housing	2.51	2.50	.0149	.467 **
Surroundings	2.53	2.46	.0677	.363 **
Campus attractiveness	2.48	2.43	.0522	.553 **
Cost of attendance	2.35	2.24	.1119 *	.765 **
Quality of social life	2.48	2.49	-.0075	.568 **
Off-campus opportunities	2.23	2.21	.0150	.568 **
Extracurricular activities	2.61	2.50	.1119 *	.433 **

Scale: 1 = Not Important; 2 = Somewhat Important; 3 = Very Important
* p < .05 ** p < .01

Table 2 displays the mean quality ratings for all comparisons (i.e., regardless of whether the college being rated was the CC). Once again, all the paired ratings are correlated to a statistically significant degree, and now half the differences (seven out of 13) are also significant. Little information can be gained from the fact that all but one of the differences are negative, since some of the comparisons involve ratings of colleges that were not CC for either questionnaire.

Table 2
Comparison of Quality Ratings, all Colleges

Characteristic	**Mean1**	**Mean2**	**Difference**	**Corr**
Academic reputation	3.45	3.48	-.0284	.453 **
Availability of majors	3.40	3.43	-.0287	.561 **
Special academic programs	3.09	3.51	-.4130 **	.269 **
Personal attention	3.20	3.32	-.1145	.499 **
Academic facilities	3.28	3.54	-.2604 **	.191 *
Recreational facilities	3.15	3.42	-.2761 **	.403 **
Quality of campus housing	2.92	3.16	-.2468 **	.408 **
Surroundings	2.91	2.90	.0121	.602 **
Campus attractiveness	3.41	3.53	-.1205	.405 **
Cost of attendance	2.48	2.59	-.1090	.492 **
Quality of social life	2.91	3.26	-.4490 **	.382 **
Off-campus opportunities	2.98	3.21	-.2267 *	.341 **
Extracurricular activities	3.26	3.46	-.2062 *	.330 **

Scale: 1 = Poor/Fair, 2 = Good, 3 = Very Good, 4 = Excellent
* p < .05 ** p < .01

Table 3 analyzes only the ratings of colleges that were the CC for one of the questionnaires. In this table, the column labeled Mean1 shows the mean ratings of the college **when it was CC1** (that is, when it was the college asking the question), and the Mean2 column shows the ratings of the college when it was rated as College A or College B. Far from being inflated, the CC ratings are actually lower than the A/B ratings for 10 of the 13 characteristics, although only five of the differences are significant.

Table 3
Comparison of Quality Ratings, CC Only

Characteristic	**Mean1**	**Mean2**	**Difference**	**Corr**
Academic reputation	3.46	3.45	.0152	.565 **
Availability of majors	3.38	3.41	-.0308	.690 **
Special academic programs	3.13	3.49	-.3558 **	.284 **
Personal attention	3.32	3.33	-.0082	.658 **
Academic facilities	3.32	3.50	-.1825 *	.255 **
Recreational facilities	3.18	3.37	-.1901 *	.422 **
Quality of campus housing	2.98	3.11	-.1382	.461 **
Surroundings	2.86	2.79	.0720	.758 **
Campus attractiveness	3.45	3.45	.0000	.620 **
Cost of attendance	2.54	2.72	-.1795	.524 **
Quality of social life	2.66	3.19	-.5370 **	.397 **
Off-campus opportunities	2.95	3.20	-.2500 *	.422 **
Extracurricular activities	3.26	3.40	-.1356	.261 **

Scale: 1 = Poor/Fair, 2 = Good, 3 = Very Good, 4 = Excellent
* p < .05 ** p < .01

Table 4 examines the frequency with which specific images are associated with the college when it is rated as CC and as A or B. Since each field contains a "1" if the image is marked and a "0" if it is not, the means shown represent the percentage of respondents marking each image. Once again, the correlations are all high.

Table 4
Comparison of Images Marked, CC Only

College Image	**Mean1**	**Mean2**	**Difference**	**Corr**
Isolated	.141	.148	-.0074	.611 **
Prestigious	.541	.519	.0222	.748 **
Fun	.563	.474	.0889 *	.508 **
Intellectual	.615	.652	-.0370	.572 **
Career-oriented	.385	.430	-.0444	.482 **
Not well-known	.126	.185	-.0593	.509 **
Comfortable	.467	.437	.0296	.463 **
Back-up school	.104	.185	-.0815 **	.588 **
Selective	.600	.585	.0148	.571 **
Athletics	.378	.437	-.0593	.638 **
Friendly	.659	.644	.0148	.543 **
Partying	.259	.289	-.0296	.667 **
Average	.059	.111	-.0519 *	.510 **
Challenging	.726	.682	.0444	.578 **

Scale: 1 = Marked, 0 = Not Marked
* p < .05 ** p < .01

While there are only three differences that are significant it is interesting that all of the images that might be perceived as "negative" -- Isolated, Not Well-Known, Back-up School, Partying, and Average -- were marked less often when the college rated was asking the question. Conversely, most of the positive images -- Prestigious, Fun, Comfortable, Selective, Friendly, and Challenging -- were marked more often when the college rated was the CC.

Table 5 compares the mean ratings of the quality of information about the college provided by each source of information. For some reason most of these differences are enormous. Although the data were rechecked to verify these, it is possible that there remains uncaught some error in one of the many data transformations that would result in differences of this magnitude. All the differences were negative, again meaning that the college being rated received higher ratings when it was not the CC.

Table 5

Comparison of Quality Ratings, CC Only
Sources of Information

Information Source	**Mean1**	**Mean2**	**Difference**	**Corr**
High school visits	2.41	2.98	-.5690 **	.618 **
College-sponsored meetings	2.00	2.67	-.6727 **	.529 **
College publications	3.13	3.27	-.1374	.527 **
College videos	2.10	2.95	-.8462 **	.237
Financial aid communications	2.39	2.74	-.3505 **	.513 **
Campus visit	3.35	3.39	-.0481	.570 **
On-campus interview	3.04	3.29	-.2500	.439 **
Post-admissions contact	3.01	3.16	-.1557 *	.654 **
Contact with faculty	1.99	2.92	-.9333 **	.580 **
Contact with coaches	2.40	2.97	-.5714 *	.308
Contact with graduates	2.17	2.76	-.5857 **	.258 *
Contact with students	2.83	3.15	-.3191 *	.369 **

Scale: 1 = Poor/Fair, 2 = Good, 3 = Very Good, 4 = Excellent
* $p < .05$ ** $p < .01$

Table 6 displays the mean rating of the cost of attending the college. Here the cost was perceived to be slightly higher when the rated college was asking the question than when it was not. The correlation between the two ratings is very high.

Table 6

Comparison of Rating of Cost of Attending, CC Only

Mean1	**Mean2**	**Difference**	**Corr**
5.51	5.38	.1376	.866 **

Scale: 1 = Very Low, 8 = Very High
** $p < .01$

Discussion

Although this paper was meant to describe the methodology involved in comparing matched ratings rather than the results of the comparisons themselves, the preliminary results do have some implications for future research. First, in order to make this type of study meaningful the number of comparisons must be sufficiently large and representative. The 14 participants in the 1993 Plus service who are also members of the Consortium on the Financing of Higher Education (COFHE) have been asked to participate in the 1994 study by supplying SSNs for their respondents. With this group of colleges there is a high likelihood that a large number of students will have rated more than one college.

However, the larger the number of cases analyzed, the more likely that small numeric differences will be statistically significant. Since it would seem to be desirable to find small differences, or even no differences at all, in a study of the consistency of the ratings, the distinction between statistically significant differences and differences that are large enough to be important will be critical. It should be noted that some informal comparisons of aggregate sets of ratings of CC/competitor pairs, made during the field tests of the Plus survey, indicated that there was high consistency overall.

A second point is that the problem of restriction of range will have to be dealt with. On the one hand, the range of values is very narrow: importance is a three-point scale, quality ratings use a four-point scale, the images are dichotomous. The rating of cost uses an eight-point scale, and it is noteworthy that the cost ratings for this preliminary study had the highest correlation (.866) of all the variables.

On the other hand, the range of values is likely to be even more restricted because the respondents generally rate as A and B colleges that are among their top choices. The respondents just don't give very many low ratings to colleges they would like to attend. The fact that the respondents are forced to rate CC (if they return the questionnaire at all) may explain why the ratings of CC tended to be lower than the ratings of the same college when it was A or B. Nevertheless, as Table 7 shows, even non-matriculants rated CC Very Good or Excellent three-quarters of the time.

Table 7
Distribution of Ratings of College Characteristics

	Poor/ Fair	**Good**	**Very Good**	**Excel- lent**	**N of Ratings**
Colleges A and B	3.7%	14.9%	33.8%	47.6%	3025
CC	4.0%	17.7%	40.9%	37.3%	1495
CC - Matriculants	0.5%	11.0%	36.5%	52.0%	373
CC - Non-Matrics	5.2%	20.0%	42.4%	32.4%	1122

The fact that the respondents are forced to rate CC brings up a third point, which is that future analyses should differentiate between ratings involving CC and those of Colleges A and B only. The sign of the difference between mean ratings is interpretable when CC is involved, but has no obvious meaning for differences between A and B. It may well be that ratings are affected by when they occur in the admissions cycle and by which questionnaire was completed first, but such factors are not measurable for the available data.

In summary, the logistical complexities of dealing with comparisons such as those described here are mind-boggling. Nevertheless, because of the attraction of asking students to name and rate specific other colleges that are strong competitors of one's own (hence the popularity of the ASQ Plus) it is worth the effort to try to determine whether the students' ratings are consistent. It is to be hoped that the larger study planned for early 1994 will provide more conclusive data.

USING ADMITTED STUDENT QUESTIONNAIRE TO DETERMINE COGNITIVE FIT BETWEEN INCOMING STUDENTS AND COLLEGE AND PREDICTING THE FUTURE ENROLLMENT BEHAVIOR

Yun K. Kim, Ph.D.
Director, Office of Institutional Research
Goucher College, Baltimore Maryland

ABSTRACT

In recent years, the shrinking applicant pool combined with sky rocketing tuition and fees forced many small liberal arts colleges to think critically about their overall enrollment management. The college-fit theory and cognitive consistency and dissonance theories suggest "fit" between students and college for the optimum student retention. This study used three years of Admitted Student Questionnaire data to develop college image types and to learn which pre-enrollment image type is most likely to predict the future enrollment behavior. The results showed that students who did not demonstrate a strong pre-enrollment college image dropped out at a higher rate.

INTRODUCTION

Traditionally, many small liberal arts colleges enjoyed constant streams of high school graduates coming from their feeder schools which helped to maintain a healthy and stable enrollment. However, in recent years, the shrinking applicant pool combined with sky rocketing tuition and fees forced these colleges to think critically about their overall enrollment management. In order to maintain a relatively healthy enrollment, these colleges have to compete aggressively with larger private universities, as well as, nearby public institutions. The initial action taken by many of these colleges was to engage in recruitment campaigns (or recruitment marketing). After a decade or so of aggressive recruitment campaigns, the market seems to reached its saturation point. Slowly, but seriously many administrators and faculty are turning their focus on retention of the students who are already enrolled in their respective colleges. Historically, these colleges held an elitist view on attrition of their students - "Those students shouldn't be attending our college anyway. The college is better off without them!" Unspoken implication of this attitude was that the majority (if not all) of student attritions were due to students' academic deficiencies. Any individual who acquaints him/her self with the findings from numerous retention studies will learn that academic difficulty is just only one of multiple reasons for leaving college before earning a degree. Tinto (1989) cited five "causes" for student departure - academic difficulty, adjustment, goals, uncertainty, and commitments. A national survey on undergraduate retention cited financial difficulties, students' accomplishing their goals, other personal reasons, and poor academic progress as the four major reasons for student attrition (Chaney & Farris, 1991). Current reality is that most of small liberal arts colleges can no longer operate with an elitist attitude toward student attrition, if they hope to maintain academically and fiscally healthy enrollment stability.

Chaney & Farris (1991) found that, in the past five years, 81 percent of institutions surveyed had developed programs aimed at increasing retention. Probably all of us who are attending this conference are currently engaged in some sort of retention study and/or programs. Conventionally used tools such as exit survey and interview, nonreturning student survey, informal/formal interview, and focus group are all based on an assumption that students are leaving college due to "problems" encountered while attending that institution. This ask-and-fix model reduces multi-dimensional relationships between students and an institution to one or two concrete problems. For example, if 60% of nonreturning students said tuition was too high, this model would suggest more money for financial aid as a retention strategy. Although financial difficulty is the second most frequently cited reason for departure, after controlling for academic ability and motivation, there is almost no relationship between income and attrition (Ramist, 1981). The ask-and-fix model completely undermines what Tinto observed (and later supported by numerous researchers) as "a longitudinal process of interactions between the individual and the academic and social systems of the college" (1975, p.94). This author agrees that the ask-and-fix model has served many colleges well and it will continue to provide data on why students leave college before actualizing their educational goals. However, development of effective campus-wide retention strategies require proactive decision making models. The college-fit theory and cognitive consistency and dissonance theories offer us additional tools for understanding the complexity behind why students leave college without earning a degree.

The college-fit theory suggests that the greater the congruence between the values, goals, and attitudes of the students and those of the college, the more likely the students are to remain at that school (Taylor & Whetstone, 1983; Kalsbeek, D., 1989). Taylor & Whetstone (1983) found that the personal characteristics (i.e., values and attitudes) of academically successful men engineering students were significantly different from unsuccessful men engineering students. These researchers suggested that identifiable personal characteristics of successful students can be described and it can be used to assist students in selecting the college setting where they would best "fit." Cognitive consistency and dissonance theories help us to understand the causes of this observed correlation. These theories explain that, in general, when two cognition that are inconsistent with one another will produce discomfort that motivates the person to remove (drop out) the inconsistency to bring the cognition into harmony (Atkinson, Atkinson et al, 1987).

Attracting an incoming class with perfect cognitive fit is nearly an impossible task; however, understanding the level of "fit" between the students and the college will provide valuable data for total enrollment management and preserving educational integrity of small liberal arts colleges. In order to determined the level of fit, first we must know students' attitudes about our college before their initial enrollment. Admitted Student Questionnaire, a survey instrument designed by the College Board, tries to measure what kind of "attitudes" (or images) the accepted applicants have on a particular college. In this study, the author investigated a possible link between incoming students' pre-enrollment college images with their college enrollment behavior. In other words, by knowing one's pre-enrollment college images (attitudes about an institution), could we predict his/her enrollment persistence. This study attempted to answer two questions:

1. does a incoming student hold and express identifiable college images before his/her initial enrollment?
2. is one image type "better" than other image types, in terms of a student's enrollment behavior?

METHODOLOGY

Data from college image section of the 1990, 1991, and 1992 Admitted Student Questionnaire (ASQ) from a small liberal arts college located in the mid-Atlantic region were used for this study. College image section contains 19 words/phrases, five items are institutional specific that changed every year. Thus, the study is based on the fourteen core words/phrases (see Table 1). The respondents (admitted applicants) were ask to circle all words or phrases which are the most widely-held images of a particular college. Factor analysis was performed on the responses collected from 1026 admitted freshman applicants (see Table 2). After the factor analysis each individual was grouped into five image types. Students who are enrolled for the fall 1993 are classified as active students otherwise they were classified as inactive. Chi-Square test was performed to determine statistical significance of the relationship between the image type and the matriculated applicants' enrollment behavior.

Insert Table 1 about here

Insert Table 2 about here

RESULTS

Factor analysis on the 14 image descriptors identified four factors (see Table 3). The Rotated Factor Matrix, shown in Table 3, displays four image groupings - academic, environmental (atmosphere), social, and name recognition. Image grouping of the admitted applicants and the matriculants are displayed in Table 4. As expected, a larger proportion of the matriculants held favorable images of the College than their non-enrolling counterparts. Over 80% of the matriculants used words like "friendly," "comfortable," "challenging," and "intellectual."

Insert Table 3 about here

Insert Tabel 4 about here

As of Fall 1993, 313 (76.16%) of the matriculants are actively enrolled (see Table 5). Table 5 shows that the highest attrition (30.56%) has taken place with the group of students who did not demonstrate a strong College Image (Unknown Group). It was followed by the matriculants who held high academic image of the College, which showed an attrition rate of 28.35%, as a group. The matriculants who held a positive social image of the College and those who thought the College has low name recognition, demonstrated higher retention rates. This relationship can be observed in Table 6. It displays the chi-square expected values and the chi-square residual values. The top two loses occurred among the students who came in with a high academic image (residual = -1.9) and the students without a clear college image (residual = -2.4).

Insert Table 5 about here

Insert Table 6 about here

DISCUSSIONS AND LIMITATIONS

This study took a very simplistic approach to examining the interplay between the college image and enrollment behavior without considering one's academic preparation and abilities, gender, family income, ethnicity, & etc. The researcher is aware of limitations in forcing students into one-dimensional image type. It is a highly artificial way of understanding the relationship. Most often students of this college use adjectives like "friendly," "comfortable," "selective," "expensive," "challenging, and "not-well-known" to describe the College. These descriptors clearly overlap the factor 1 (academic reputation), factor 2 (Friendly Environment) and factor 3 (Name Recognition). Hence any conclusion must be made with a great deal of caution. Nevertheless several plausible conclusions could be drawn from the results of this study.

The data suggests that incoming freshmen with somewhat "negative" college image (i.e., partying school) persisted at a higher rate than their peers who did not demonstrate a strong college image type. The formation of a strong college image could be an indicator of students' emotional preparedness for starting college. Under this assumption, one could conclude that incoming students with a strong image type, regardless of its positivity or negativity, are more sure about their educational journeys. And, they are constantly searching for an environment which provides a highest cognitive fit between their images and the campus community. On the other hand, students who do not demonstrate a strong image type could not look for that optimum cognitive fit, because they are unclear ("unknown") about their educational goals for attending a college. They are constantly dealing with cognitive dissolutions. Most of the time, this cognitive dissolution acts as an harmful agent rather than providing the students with creative solutions. A challenge for college faculty and administrators is to find out how many of their incoming students are in this gray area and establish a program to instill "appropriate" educational goals that would be consistent with their particular college. A general consensus among researchers is that freshman orientation can be an effective tool for teaching (or indoctrinate) characteristics that are proven to be successful for a particular college (Tinto, 1975, 1987, & 1989; Ramist, 1981; Taylor & Whetstone, 1983; Kalsbeek, 1989; Chaney & Farris, 1991).

One interesting result of this study is the enrollment behaviors observed among the sixteen students who held highly social college image. This researcher was expecting to see the greatest attrition among these students. During the last five years on-campus social life has been rated extremely low in annually conducted campus environment survey. This College's students often use the word "dead" to describe the social life in general. Is it possible to assume that once a student formulates values and images, he/she will search the environment to validate his/her cognitive beliefs thus maintaining the cognitive consonance. An alternative view is, perhaps students' college images are made up of primary, secondary, and even, tertiary images. Furthermore, students are willing to live (i.e., stay enrolled) with cognitive dissonances created by secondary and tertiary images, but cognitive dissonances created by mis-fit between students' primary images and a college is much more difficult to overlook. In extreme cases, these cognitive imbalances result in the eventual departure of a student.

The college-fit theory and cognitive consistency and dissonance theories suggest that student retention starts from the moment initial contact between the college and the prospective students was made. Therefore, college personnel who regularly come in contact with the prospective students must "sell" the college in the most realistic way and seek out students who could be best served by that institution. Attracting an ever increasing freshman class might not be the most healthy thing for the institution nor for the students who must interrupt their educational journeys for their mis-matched college choice. After the initial enrollment, students must be given an opportunity to learn about the organizational culture of an institution. This "cultivation" takes on many forms - freshman orientation, First Year Experience, credit bearing college orientation classes, academic advising, and counseling are all developed to pass on the knowledge which could help the students to be successful in a given college environment. Thomas (1990) identified three common features of successful retention efforts. According to Thomas, effective retention programs are both comprehensive and coordinated. These programs almost always address several areas of students' involvement with the academic and social systems of the institution, which requires a broad range of college personnel to work cooperatively. Second, successful retention programs involve faculty and administrators who consistently establish and maintain contact with students - particularly conscious in reaching out to freshmen. Third, effective programs usually use a wide range of data (grades, SAT scores, demographics, career interests, satisfaction, etc.) and information extensively that helps faculty and administrative staff understand more about the students and attrition at their college.

Each student departure, in a minimal sense, represent interruption in the student's educational progress, lost of fiscal investment made by the college, and lost opportunity for any type of future relationship between the student and the college. Therefore understanding the complexity of student retention/attrition is critical to preserving educational integrity of many small liberal arts colleges.

Table 1
Word/Phase List

Isolated
Prestigious
Fun
Intellectual
Career-Oriented
Not well-known
Comfortable
Back-up school
Selective
Athletics
Friendly
Partying
Average
Challenging

Table 2
Number of Admitts and Matriculants Who Participated in ASQ

	All Admitted		Matriculates	
	Frequency	Percent	Frequency	Percent
Fall '90	262	25.5	80	19.40
Fall '91	332	32.4	153	37.40
Fall '92	432	42.1	178	43.20
Total	1026	100	411	100.00

Table 3
Factor Analysis
(Rotated Factor Matrix)

	Factor 1	Factor 2	Factor 3	Factor 4
Challenging	0.72378			
Intellectual	0.69217			
Selective	0.65718			
Prestigious	0.62479			
Average	0.50652			
Friendly		0.78766		
Comfortable		0.70361		
Fun		0.54306		
Partying			0.67935	
Athletics				
Isolated				0.79116
Not-Well-Known				0.59656

Table 4
Factor Distrituion of All Admitts and Matriculants

IMAGE TYPE	ALL ADMITTS		MATRICULANTS	
	Frequency	Percent	Frequency	Percent
Academic Reputation(Factor 1)	270	26.3	122	29.7
Friendly Environment (Factor 2)	419	40.8	217	52.8
Social Reputation(Factor 3)	143	13.9	16	3.9
Name Recognition (Factor 4)	78	7.6	20	4.9
Unknown	116	11.3	36	8.8
Total	1026		411	

Table 5
Number of Actively Enrolled Student

IMAGE TYPE	ORIGINAL ENROLLMENT	ENROLLED (as of Fall '93)	PERCENT
Academic Reputation (Factor 1)	127	91	71.65%
Friendly Environment(Factor 2)	217	166	76.50%
Social Reputation (Factor 3)	16	13	81.25%
Name Recognition (Factor 4)	20	18	90.00%
Unknown	36	25	69.44%
Total	411	313	76.16%

Table 6
Enrollment Status by Image Type

Count Chi-Sq. Exp. Value Chi-Sq. Resid. Value	ACTIVE STUDENT	INACTIVE STUDENT	RAW TOTAL
Academic Reputation	91 92.9 -1.9	31 29.1 1.9	122
Friendly Environment	166 165.3 -0.7	51 51.7 0.7	217
Social Reputation	13 12.2 -0.8	3 3.8 0.8	16
Name recognition	18 15.2 2.8	2 4.8 2.8	20
Unknown	25 27.4 -2.4	11 8.6 2.4	36
	313 (76.2%)	98 (23.8%)	411 (100.0%)

CHI-SQUARE	D.F.	SIGNIFICANCE
3.41123	4	0.4915

Missing observations = 36

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FACULTY SALARY EQUITY - COMPARISON OF TWO METHODOLOGIES

Denise A. Krallman
Institutional Research Analyst: Budgeting, Planning & Analysis
Miami University - Oxford

Introduction

Salary equity studies have been conducted at this university since 1978. Over this fourteen year span, the techniques used have been reviewed and modified to meet the ever growing demand for accuracy in the investigation of bias in salaries. This year similar procedures were used in order to maintain the continuity and replicability of the past. In addition, compa-ratio analysis, a corporate procedure recently applied to higher education, was introduced to compare the results found in the standard regression analysis.

I. Regression Analysis

Methodology

The traditional stepwise regression analysis was used to identify the attributes related to professional experience and qualifications that are correlated with the university faculty's current salaries. Although this procedure has drawbacks because of the lack of "human" input into the determination of which variables should be added, it has been used locally for a number of years and, therefore, to maintain consistency it was again used this year.

Data were gathered on 860 1992-93 full-time university faculty, using the same criteria for inclusion as in the AAUP and IPEDS salary surveys. In order to optimize group sizes, lecturers and senior instructors were grouped with assistant professors, assistant instructors were grouped with instructors and the faculty at the two branch campuses were grouped together as regional campus faculty. The following data elements were used in the regression equations for predicting 1992-93 faculty salaries: academic rank, years of university service, age, years in current rank at the university, years since completion of highest degree, possession of doctorate (dummy variable with 0 = no doctorate, 1 = doctorate or other higher degree) and relative market value of the individual's discipline. This disciplinary market factor is from the NASULGC 1991-92 Faculty Salary Survey by Discipline conducted by the Office of Institutional Research at Oklahoma State University. It is a measure of current relative disciplinary market value defined as the national ratio of (the average salary paid to faculty at a given rank in a specific discipline) to (the average salary paid to faculty at that rank in all disciplines combined). This is used in place of department, which is included in many salary equity studies, to identify differences in market value or worth.

Two models were used within stepwise regression to determine salary equity at each individual rank and then again using the four ranks as dummy variables. They were: all white main campus males, and all faculty. From these analyses, the residuals (actual minus predicted salary) were tested for significant differences on gender and campus (main versus regional) using analysis of variance (ANOVA). Similar procedures were used to test for ethnic salary bias, and for divisional differences.

Analysis and Results

Gender Equity

The first series of analyses - using both models - looked at each rank independently. The model using white main campus male faculty as the basis for building an equation for predicting salary was run first to determine the existence of gender inequities in salaries at each rank. This is the standard process for detecting existing bias. After the equations were established with the predictor variables (Table 1), a 2-way ANOVA was run on the residual salaries (Actual salary minus Predicted salary) to test for statistically significant differences for gender and campus (main vs regional). At each of the four ranks, there were no statistically significant differences 1) between males and females with respect to their residual salaries, 2) between the main campus and the regional campus and 3) interactions between gender and campus.

The second model,using all faculty as opposed to white main campus males, is based on the assumption that there is no bias in salary (see above) and is typically the primary model used when the purpose of a study is to explain or predict salary levels. After the stepwise regression analysis was run, equations were established for each rank (Table 2). When a 2-way ANOVA (gender by campus) was run, no statistically significant differences were found. Tables were supplied to the Provost that included information for each individual faculty with respect to their salary, residual from predicted salary and those who fell 1.0 to 2.5 standard deviations above or below the mean residual of their respective rank.

The second series of analyses - run on both models - used each rank as a dummy variable (e.g., Professor: 1 = Yes 0 = No). As before, the white main campus male model was run first to identify any bias in salaries. After the residuals were calculated using the equation of statistically significant predictors (Table 3), a 2-way ANOVA was run (gender by campus) for each rank. The only statistically significant difference found on the residuals was a gender by campus interactive effect at the Associate Professor level. The mean residuals show that the male Associate Professors at the regional campuses have much lower actual salaries with respect to their predicted salaries than do any of the other three groups (-2,912 vs 60, -630 and 1,077). This large difference, coupled with the female Associate Professors at the regional campuses having the largest positive mean residual(1,077), explains the statistically significant interaction effect.

In the all-faculty model using rank as a dummy variable, an equation almost identical to the white main campus male model was developed. In the 2-way ANOVA of the residuals, a statistically significant difference for Associate Professors was again found in the gender by campus interaction. The mean residuals show the same pattern as in the previous model, with male Associate Professors on the regional campuses having a markedly larger negative mean residual, and the regional campuses female Associate Professors with a large positive mean residual.

Ethnic Equity

The same procedures were used to test for ethnic salary inequities as were used for testing for gender bias in salaries. Because of the small number of full-time faculty in the various ethnic groups, all minority faculty were grouped together for the initial regression analyses. Then, if any statistically significant differences were found, separate analyses would be run on those means to identify which groups were actually contributing to the differences.

Table 1
Stepwise Regression Equations for Salary Prediction

White Main Campus Male Model

	Regression Coefficients							
	Professor		*Associate*		*Assistant*		*Instructor*	
Possible Predictions	b	R-Sq	b	R-Sq	b	R-Sq	b	R-Sq
Age	-----		188.13	0.66	-----		-----	
Years of Service	-874.95	0.46	-----		563.65	0.82	-----	
Years in Rank	994.72	0.25	358.34	0.64	-----		693.55	0.57
Years Since Highest Degree	693.49	0.63	-----		-188.55	0.83	-----	
Possess Doctorate	-----		-----		-----		-----	
Disciplinary Market Factor	327.35	0.56	345.99	0.44	333.75	0.73	-----	
Constant	20989.25		867.01		2930.06		26771.12	
Overall R-Sq		0.63		0.66		0.83		0.57

Table 2
Stepwise Regression Equations for Salary Prediction

All Faculty Model

	Regression Coefficients							
	Professor		*Associate*		*Assistant*		*Instructor*	
Possible Predictions	b	R-Sq	b	R-Sq	b	R-Sq	b	R-Sq
Age	——		——		——		——	
Years of Service	-819.33	0.46	174.87	0.63	458.45	0.75	——	
Years in Rank	1045.89	0.27	344.89	0.61	——		658.52	0.22
Years Since Highest Degree	600.23	0.63	——		——		——	
Possess Doctorate	——		——		——		——	
Disciplinary Market Factor	327.16	0.57	328.04	0.41	324.96	0.55	125.45	0.32
Constant	21560.48		8991.61		3190.63		13957.09	
Overall R-Sq		0.63		0.63		0.75		0.32

Notes:
1. A blank coefficient (——) entry indicates that the predictor did not contribute to the regression equation.

2. "b" = Unstandardized regression coefficient.

3. "R-Sq" = Amount of variance in salary accounted for by the predictor as loaded into the regression equation.

4. "Possess Doctorate" variable was dummy coded. "1" meant possess doctorate, "0" meant no doctorate.

5. Disciplinary Market Factor" taken from 1991-92 Faculty Salary by Discipline Study of NASULGC Schools by Oklahoma State University.

6. "Overall R-Sq" = The total varience of salary accounted for by regression equation.

Table 3
Stepwise Regression Equations for Salary Prediction

Two Models Using Rank as a Dummy Variable

	Regression Coefficients			
	White Male Main Cmp Faculty		*All Faculty*	
Possible Predictions	b	R-Sq	b	R-Sq
Academic Status			——	
Professor	22211.61	0.47	21525.40	0.49
Associate	8169.09	0.78	7415.99	0.61
Assistant	——		——	
Instructor	-9284.57	0.80	-9561.66	0.82
Age	172.48	0.83	131.65	0.84
Years of Service	-520.26	0.82	-385.67	0.83
Years in Rank	850.22	0.72	782.42	0.79
Years Since Highest Degree	171.17	0.83	128.64	0.84
Possess Doctorate	——		——	
Disciplinary Market Factor	324.85	0.59	314.02	0.70
Constant	-3692.03		-854.25	

Table 4
Stepwise Regression Equations for Salary Prediction

White Faculty Model (Ethnic Bias)

	Regression Coefficients							
	Professor		*Associate*		*Assistant*		*Instructor*	
Possible Predictions	b	R-Sq	b	R-Sq	b	R-Sq	b	R-Sq
Age	——		——		——		——	
Years of Service	-803.12	0.46	181.77	0.61	482.31	0.78	——	
Years in Rank	957.14	0.27	319.17	0.60	——		668.40	0.24
Years Since Highest Degree	697.14	0.63	——		——		——	
Possess Doctorate	——		——		——		——	
Disciplinary Market Factor	336.04	0.57	322.55	0.41	328.75	0.56	135.64	0.34
Constant	19005.15		9567.46		2457.04		12858.03	
Overall R-Sq		0.63		0.61		0.78		0.34

Notes:

1. A blank coefficient (-----) entry indicates that the predictor did not contribute to the regression equation.

2. "b" = Unstandardized regression coefficient.

3. "R-Sq" = Amount of variance in salary accounted for by the predictor as loaded into the regression equation.

4. "Possess Doctorate" variable was dummy coded. "1" meant possess doctorate, "0" meant no doctorate.

5. Disciplinary Market Factor" taken from 1991-92 Faculty Salary by Discipline Study of NASULGC Schools by Oklahoma State University.

6. "Overall R-Sq" = The total varience of salary accounted for by regression equation.

The first model was developed using all white faculty and was run for each of the four ranks (Table 4). When ANOVAs were run on the residuals comparing white faculty to minority faculty, the only statistically significant difference was found at the Assistant Professor level. Here minority faculty had a mean residual of over $1,400 higher than white faculty.

In the second model, using the all faculty model, an ANOVA was run on the residuals comparing minority to white faculty and as expected (since there was a significance in the previous model), there was a statistically significant difference at the Assistant Professor level (white = -209; minority = 1,147). Because of this significant difference, T-tests were than run for each ethnic group against the remaining faculty to identify where the differences at the Assistant Professor level were actually occurring. The results of these T-tests show that the difference is occurring in the black assistant professor salaries, that is, black Assistant Professors have statistically significant higher positive residuals (actual minus predicted) than the remaining Miami Assistant Professors. A further breakdown shows that this difference can be tied to the black female Assistant Professors.

Divisional Equity

Using the equations defined by the "all faculty" model, residuals were analyzed for divisional differences using ANOVA. Statistically significant differences were found between divisions at all four ranks (Table 5).

Table 5
ANOVA of Divisional Differences on
Mean Residual by Rank

Rank	F-Statistic	p-value
Professor	3.134	.009
Associate Prof	3.911	.002
Assistant Prof	2.458	.034
Instructor	3.997	.003

In order to determine which divisions were contributing to these differences, T-tests were run for each of the ranks, comparing each division's mean residuals for faculty at these ranks to the remaining university faculty at the same rank. The tests found that for Professors, the statistically significant divisional difference can be attributed to School 'B' where Professors in this school have mean residual almost $3,700 greater than the remaining university Professors and to School 'D' whose Professors have a mean residual of nearly $2,600 less than the remaining university professors.

At the Associate Professor level, the statistically significant difference is found to lie in two divisions - School 'F' where the mean residual for Associate Professors is over $3,600 greater than the mean for all other Associate Professors and in School 'A' with a lower mean residual (difference of $1,000) than the remainder of the faculty at this rank. For Assistant Professors, the difference was found in School 'A' with a lower mean residual from the rest of the faculty and statistically significant T-value.

II. Compa-Ratio Analysis

Methodology

In a recent study, Bereman and Scott (1991)[1] introduced compa-ratio analysis, a tested corporate practice for reviewing salary and gender bias, to higher education. The compa-ratio is the "ratio of an actual pay rate (numerator) to the midpoint for the respective pay grade (denominator)" (Bereman and Scott, 1991). For example, a compa-ratio for an individual of less than 1.0 says that he/she is being paid below the average and a compa-ratio for an individual that is greater than 1.0 indicates that he/she receives compensation above the pay-grade average.

In industry, the compa-ratio has been used for cost control, merit pay decisions, to monitor organizational unit compliance with overall pay policy, to audit wage changes and to examine the effect of turnover on wage costs. Finally, it has been "applied to the problems of differential salary treatment of selected groups of employees in conjunction with multiple regression techniques. After separating employees by such demographics as gender, race or age group, a compa-ratio analysis could provide a first indication that there is potential bias for or against certain groups of employees" (Bereman & Scott, 1991).

In their analysis, applying this theory to higher education, Bereman and Scott developed a compa-ratio based on faculty rank and discipline. This was achieved by dividing each faculty member's salary by the NASULGC salary average for his/her rank and discipline.[2] This ratio was then used to identify faculty who were above or below the national average. Their findings indicated that the compa-ratio is readily adaptable to the higher education environment and easily understood by administrators and faculty. "It permitted the institution to examine all salaries in the context of the national academic labor market, thereby mitigating internal discriminatory influences while assessing relative competitiveness across disciplines" (Bereman & Scott, 1991). The key to the acceptance of compa-ratio in salary equity analyses rests on the acceptance of rank and discipline as appropriate predictors of salary. In summary, the authors pointed to possible applications of the compa-ratio technique:

1. Evaluate an institutional salary structure internally, if one identifies midpoints for the various ranks as the mean of the salaries in each. This would enable higher education administrators to:
   - identify structural problems, such as compression and inversion.
   - to gauge how well the rewards system supports institutional goals.
   - to compare salary levels across academic units.
   - to estimate the costs of corrective measures.
2. In conjunction with external salary data, the compa-ratio could compare an institution's pay scale to the larger academic labor

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[1] Nancy A. Bereman and Joyce A. Scott, "Using the Compa-Ratio to Detect Gender Bias in Faculty Salaries" Journal of Higher Education, 62(1991), 556-569.

[2] This average salary is found in the NASULGC 1991-92 Faculty Salary Survey by Discipline conducted by the Office of Institutional Research at Oklahoma State University.

market. This would allow the university to:

- measure relative competitiveness in discipline areas.
- measure the cost of enhanced competitiveness.

3. In the context of salary biases, the compa-ratio could serve as a monitoring device, a means by which institutional progress toward salary equity would be checked and understood.

Analysis & Results

Two different methodologies were utilized using the compa-ratio concept to evaluate salaries at the university. First, simple comparisons were made between male/female, main/regional campus, minority/non-minority and divisional compa-ratios at each rank. Second, new regression analyses were conducted eliminating the disciplinary market factor and rank as components of the equation and replacing faculty salary with individual compa-ratios to determine the existence of gender biases.

Method 1

Using the individual faculty compa-ratio, subgroup means were calculated by averaging individual ratios rather than dividing the total salaries by total NASULGC rank/discipline averages. Table 6 shows the means by various subgroups that identify how the university's faculty salaries compare to the national average for particular ranks and other subgroups - gender, campus, ethnicity and division.

Looking at the compa-ratio by gender, it is apparent that overall both males and females at all ranks have salaries that are comparable to or even above the average of the national salaries (taking into account discipline). When tested for difference between the means there is a statistically significant difference at the associate professor level, with the male compa-ratio higher than the female compa-ratio.

There was a statistically significant campus difference at the associate professor level, but there were no statistically significant minority/non-minority differences at any rank. Finally, when a 2-way ANOVA was run on the compa-ratio of gender by campus, only gender differences were statistically significant (at the Associate Professor level)- campus differences became statistically insignificant. That is, when both gender and campus location are considered together, gender alone accounts for any statistically significant differences in the compa-ratio at the Associate Professor level.

Method 2

In this method, the compa-ratio is substituted for salary in the regression analyses and disciplinary market factor and rank are removed as predictors. After a regression equation was developed, ANOVAs were run on the residuals to look for significant differences at each rank with respect to gender and campus and on the faculty as a whole. The regression results are shown in Table 7.

The first regression was run on white main campus male faculty to determine the presence of gender inequities at each rank and to parallel the standard regression models. The variables included in the stepwise regression were age, years of service at the university, years in current rank, years since highest degree received and the possession of a doctorate.

When 2-way ANOVAs were run at each rank on the compa-ratio residuals created from the white main campus male regression model, significant F-statistics were found for Professors by gender, for Associate Professors by campus level and for Assistant professors in the gender by campus interaction. For both male and female Professors, their mean compa-ratio residuals were negative (actual smaller than predicted), however, male Professors displayed a larger negative value (-.026) implying that they have a smaller actual compa-ratio as compared to their predicted than do their female counterparts (-.021). That is, female Professors have a mean compa-ratio closer to predicted than do male professors.

At the Associate Professor level, the statistically significant difference is caused by the regional campus Associate Professors having a mean residual of -.023 compared to the main campus faculty where their mean residual was .029. That is, the compa-ratio predicted for Associate Professors at the regional campuses was higher than their actual compa-ratios and the resulting mean residuals were markedly different from their main campus counterparts.

At the Assistant Professor level the mean residuals of the interaction of gender and campus show that regional campus female faculty have the lowest mean residual while the regional campus male faculty have the highest mean residual. That is, female Assistant Professors on the regional campuses have compa-ratios below the compa-ratio as predicted by the regression equation, and regional campus male Assistant Professors have compa-ratios above their predicted ratios.

Using the all-faculty model, residuals were calculated from the regression equation (Table 5) and 2-way ANOVAs were then run on these residuals using gender and campus. The results from the ANOVA's were of the same type as those found in the white main campus model, a gender difference for Professors, a campus difference at the Associate Professor rank and a significant gender by campus interaction at the Assistant Professor level.

Summary

Listed below are some of the more important highlights of the analyses discussed above. These do not encompass all of the findings but do identify those that appear to have the greatest consequences with respect to the salary equity issue at this university.

- Using the traditional stepwise regression model, no gender biases were found at any of the four ranks studied.
- When rank was added as a predictor in the regression model (as dummy variables), a gender by campus interaction effect was found at the Associate Professor level.
- In the investigation of ethnicity bias in salaries, it was found that black female Assistant Professors are paid more than other assistant professors with respect to their predicted salaries.
- In the analysis of divisional differences in the salary equity regression model, School 'B' had larger positive residuals than the other divisions at the Professor level.
- Divisional differences were also found at the Associate Professor rank and were attributable to School 'F', where the Associate Professors in this school have larger positive residuals than the other divisions and to School 'A' with a negative mean residual. However, no particular component of the college could be shown to be the major contributor to this difference.
- Market factor was utilized in different ways in this study.
  - As a predictor of salary in the regression models, disciplinary market factor loaded as a contributing variable at all four levels.
  - Compa-ratio analysis, a new portion to this year's salary equity study, used disciplinary salaries (which define market value) as part of the component to take the place of salary in the regression model.
- In the compa-ratio analysis, looking at gender and campus

Table 6
Mean Compa-Ratios
By Rank and Selected Subgroups

Group	Total Mean	N	Professor Mean	N	Associate Mean	N	Assistant Mean	N	Instructor Mean	N
Total	1.03	860	1.01	265	1.05	277	1.03	247	1.03	71
Male	1.03	597	1.01	238	1.06	197	1.03	126	1.06	36
Female	1.02	263	1.00	27	1.02	80	1.03	121	1.01	35
Main	1.03	756	1.01	255	1.06	242	1.02	198	1.04	61
Regional	1.02	104	0.97	10	1.00	35	1.05	49	1.00	10
School 'A'	1.03	456	1.01	156	1.07	140	1.02	131	1.00	29
School 'B'	1.11	115	1.10	32	1.07	33	1.09	36	1.25	14
School 'C'	0.96	145	0.95	38	0.97	49	0.99	37	0.87	21
School 'D'	1.03	76	1.00	25	1.05	27	1.03	22	1.17	2
School 'E'	1.01	55	0.97	11	1.04	23	0.96	17	1.19	4
School 'F'	1.11	13	0.93	3	1.13	5	1.14	4	1.46	1
Minority	1.03	72	1.03	11	1.03	17	1.03	38	1.00	6
Non-Minority	1.03	788	1.01	254	1.06	260	1.02	209	1.04	65

Table 7
Stepwise Regression Equations
for
Compa-Ratio Prediction

	Regression Coefficients			
	White Male Main Cmp Faculty		*All Faculty Model*	
Possible Predictions	b	R-Sq	b	R-Sq
Age	0.003	0.35	——	
Years of Service	-0.008	0.33	-0.006	0.29
Years in Current Rank	0.017	0.28	0.017	0.26
Years Since Highest Degree	——		0.002	0.30
Possess Doctorate	-0.053	0.34	-0.029	0.30
Constant	0.882		0.973	
Overall R-Sq		0.35		0.30

Notes:

1. A blank coefficient (——) entry indicates that the predictor did not contribute to the regression equation.

2. "b" = Unstandardized regression coefficient.

3. "R-Sq" = Amount of variance in salary accounted for by the predictor as loaded into the regression equation.

4. "Possess Doctorate" variable was dummy coded. "1" meant possess doctorate, "0" meant no doctorate.

5. Disciplinary Market Factor" taken from 1991-92 Faculty Salary by Discipline Study of NASULGC Schools by Oklahoma State University.

6. "Overall R-Sq" = The total varience of salary accounted for by regression equation.

means independently showed statistically significant differences for both at the Associate Professor level. However, when a 2-way ANOVA was run, only gender appeared statistically significant.

When a stepwise regression analysis, parallel to the original regression models, was run using compa-ratio in place of salary, differences were found that were not found in the salary regression models. In this new regression, statistically significant gender by campus interactions were found for Assistant Professors in the "white main campus male" model and the "all faculty model". In addition, both models showed a statistically significant campus difference at the Associate Professor level, and a statistically significant gender difference for Professors.

Conclusion

The traditional salary equity analyses conducted this year continue to reinforce the knowledge that Miami University does not adversely discriminate on the basis of gender or ethnicity with respect to faculty salary. However, when looking at the regression model with rank as a dummy variable, a gender by campus interaction effect was found at the Associate Professor level.

When using compa-ratio as the basis for determining salary equity, simple tests of the mean showed a gender difference at the Associate Professor level. When using a regression model, replacing salary with compa-ratio, additional differences were found - gender by campus interaction at the Assistant Professor level, a campus difference at the Associate Professor level and a gender difference at the Professor level. However, these differences do not necessarily reflect an inequity in the direction most often assumed in faculty salaries. In fact, the opposite is true. That is, the average male faculty compa-ratio is lower than the female (or in the case of regression analyses, the mean residual) at both the Associate Professor and Professor levels. The campus difference at the Associate Professor level in the regression analyses is reflective of the results from the standard regression models. Finally, at the Assistant Professor level, the interaction of campus and gender can be explained by the combining of Senior Instructor (found largely on the regional campuses) with Assistant Professor and the phenomena found at this university - tenured Assistant Professors (once again, more readily found on the regional campuses).

These studies supply us with the ability to identify those faculty, male and female, whose actual salaries fall significantly above and below what is predicted for them given criteria such as years of service, years in current rank and the discipline in which they teach. With this information, the administration can continue to address inequities concentrating on those areas where statistically significant differences have been identified.

SALARY COMPRESSION ANALYSIS

Denise A. Krallman
Institutional Research Analyst: Budgeting,Planning & Analysis
Miami University

Introduction

The general assumption within higher education is that since "faculty capability is basically tied to professional maturity, then internal average salary structures should exhibit patterns that increase with professional maturity (measured using rank and tenure in rank)"[1]. Salary compression occurs when this link between professional maturity and salary are disproportionate. Many factors can cause salary compression, some of them very appropriate. However, this does not help the morale and feelings of alienation of those who are experiencing the compressed salaries.

Methodology

This study will approach the concept of salary compression from two vastly different methods. The first, a continuation of work done at this university over the past two years, focuses on faculty with doctoral degrees and uses years-since-doctorate as the measurement of maturity. Salary growth was then defined in relation to what new assistant professors without any post-doctoral experience were paid at this university in 1992-93, with adjustments for disciplinary market factors.

The second method follows the procedure described by Snyder (1992) where salary comparisons within ranks were made using standardized average salaries and time-in-rank for divisions and the regional campuses.

'Home' Method

The average 1992-93 salary of the new assistant professors who were awarded doctorates in 1992-93 and who began university services during the academic year 1992-93 was $33,300 and the mean disciplinary market factor for the newly hired assistant professors was 93.17[2]. Therefore, by knowing the mean disciplinary market factor for the newly hired assistant professors, it is possible to estimate the 1992-93 starting salary for a new assistant professor for each department whether or not a new person was actually hired in that department for the current academic year.

At both the main and regional campuses, for each full-time faculty member who has a doctorate, a projected salary was computed as the present value of the estimated 1992-93 new assistant professor's salary in the faculty member's discipline compounded at a given uniform rate for the number of years since the doctoral degree was awarded. Actual salaries were then compared to the projected salaries at five assumed annual growth rates ranging from 1.0% to 3.0% in half-percent increments used in previous studies.

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[1] Julie K. Snyder, Gerald W. McLaughlin & James R. Montgomery, "Diagnosing and Dealing with Salary Compression", Research in Higher Education, 33 (1992), 113-124.

[2] This market factor is from the NASULGC Faculty Salary Survey by Discipline conducted by the Office of Institutional Research at Oklahoma State University and is the ratio of the average salary of new assistant professors in a given discipline to the average salary of new assistant professors in all disciplines combined.

Figure 1 shows the percentage of faculty in each post-doctorate cohort group (in 7 year increments by number of years since completion of doctorate) whose present salaries are below their projected salaries assuming uniform growth rates of 1.0%, 1.5%, 2.0%, 2.5% and 3.0%. Seven year increments were chosen for this study to coincide with the length of time an assistant professor must have in service before tenure. Interpretation of this graph yields the following observations:

1. Faculty with 7 years or less since their doctorate had 60 percent or more with actual salaries below projected for four of the five growth rates, the exception being at the 1.0% growth rate where the percentage of faculty with actual salaries below projected is slightly below 60 percent.
2. Because of a relatively small N for those with 29 or more years since their doctorate (N = 33), the data should be considered carefully before drawing any conclusions about longevity and compression.
3. At 2.5% growth rate, nearly 60 percent of all faculty with doctorates have actual salaries below their projected salaries regardless of the number of years since their doctorate. At the 2.0% growth rate, this percentage drops to 43. This would advance the theory of a normal growth rate of between 2.0% and 2.5% where 50 percent of the faculty fall above/below their projected salaries.

Table 1 shows the percentage of faculty in each academic division whose actual salaries fall below the salaries projected at each of the five growth rates. From this table it can be seen that School 'C' has the most serious problem with salary compression, followed by School 'A'. For each growth rate, these two divisions consistently display the largest percentages of faculty with actual salaries below their projected growth salaries. When looking at divisional differences using the time intervals discussed above, the following observations can be made (see Table 2):

1. School 'C' plays a large role in each time interval, accounting for a considerable portion of those faculty who do not meet or exceed their projected salaries at the various growth rates. That is, compression affects the faculty within the school in all intervals to a greater extent than the other divisions.
2. In the "7 Years or Less Since Doctorate" category, School 'A' faculty also contribute heavily to the overall percent with actual salaries below their projected growth salaries. In the other time intervals, School 'A' faculty are more consistent with the faculty in the other divisions.
3. The doctoral faculty in School 'B' are less affected by compression at all time intervals for all five growth rates when compared to Schools 'A' and 'C'.

When looking at the projected growth salaries by rank and division at each of the five growth rates (Table 3), the doctoral faculty within School 'C' continue to display the most significant impact because of compression. For example, using the 2.0% growth rate, within School 'C' 63.9 percent of the 36 professors, 90.2 percent of the 41 associate professors, and 83.3 percent of the 30 assistant professors had salaries below their projected growth

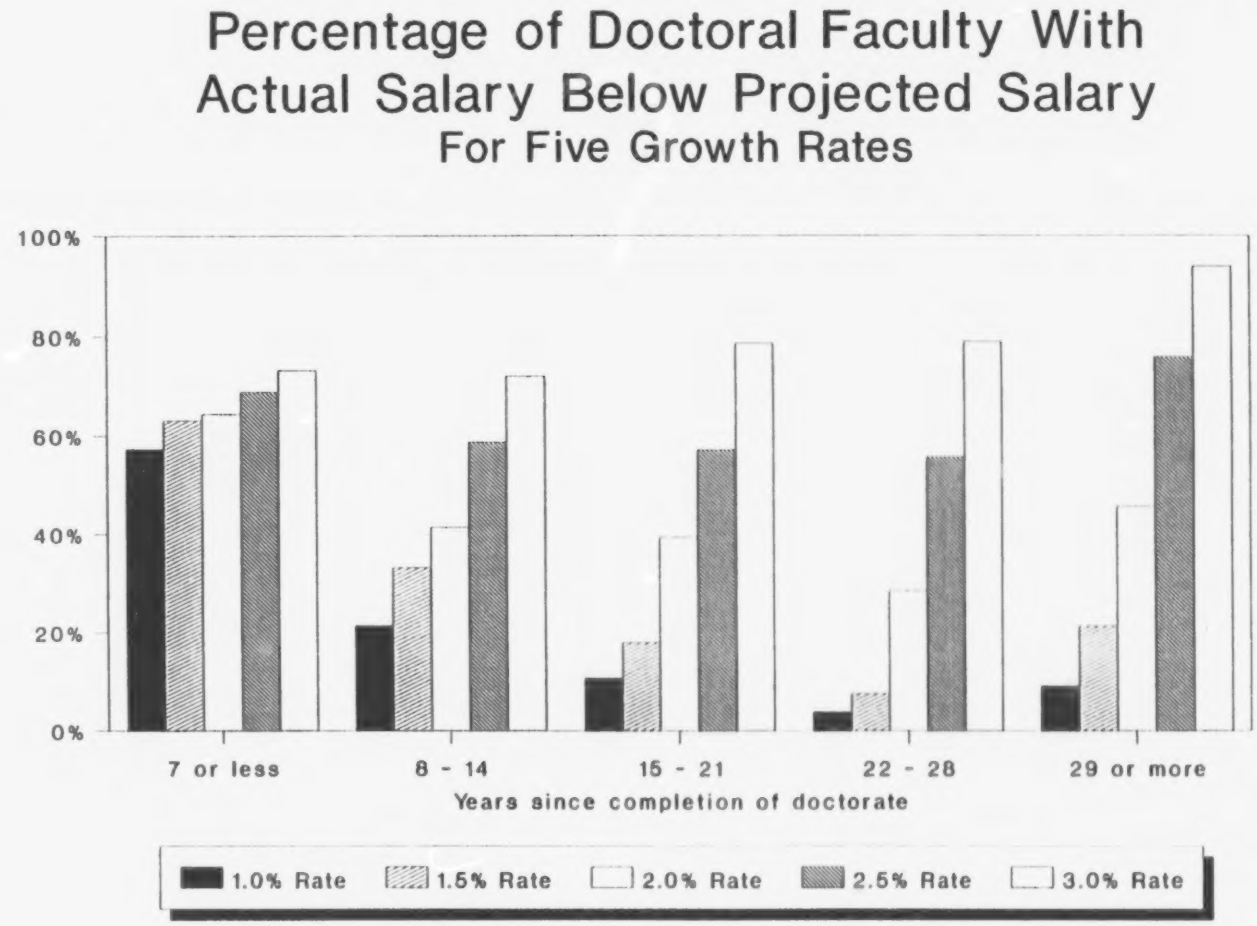
Percentage of Doctoral Faculty With Actual Salary Below Projected Salary
For Five Growth Rates
100%
80%
60%
40%
20%
0%
7 or less
8 - 14
15 - 21
22 - 28
29 or more
Years since completion of doctorate
1.0% Rate
1.5% Rate
2.0% Rate
2.5% Rate
3.0% Rate

Figure 1

Table 1

Percent of Doctoral Faculty Whose Actual Salaries Are Below Projected Growth Salaries by Academic School

School	No. of Faculty	Percentage of Faculty At Each Growth Rate 1.0%	1.5%	2.0%	2.5%	3.0%
School 'A'	396	18.9	27.0	40.9	60.6	78.0
School 'B'	95	7.4	8.4	20.0	34.7	53.7
School 'C'	107	56.1	66.4	79.4	87.9	94.4
School 'D'	26	11.5	15.4	15.4	30.8	46.2
School 'E'	24	8.3	20.8	45.8	58.3	62.5
School 'F'	12	8.3	8.3	8.3	16.7	25.0
TOTAL DOCTORAL FACULTY/AVG	660	22.4	29.7	42.7	59.2	74.4

Table 2

Percent of Doctoral Faculty Whose Actual Salaries Are Below Projected Growth Salaries By Academic School and Years Since Doctorate

School By Years	No. of Faculty	Percentage of Faculty At Each Growth Rate 1.0%	1.5%	2.0%	2.5%	3.0%
7 Years or Less	**157**	**57.3**	**63.1**	**64.3**	**68.8**	**73.2**
School 'A'	83	63.9	72.3	72.3	74.7	79.5
School 'B'	21	23.8	23.8	23.8	33.3	42.9
School 'C'	35	82.9	85.7	91.4	94.3	97.1
School 'D'	7	42.9	57.1	57.1	71.4	71.4
School 'E'	7	0.0	0.0	0.0	14.3	14.3
School 'F'	4	0.0	0.0	0.0	0.0	0.0
8 to 14 Years	**150**	**21.3**	**33.3**	**41.3**	**58.7**	**72.0**
School 'A'	80	16.3	31.3	37.5	62.5	77.5
School 'B'	25	8.0	12.0	24.0	32.0	44.0
School 'C'	29	55.2	69.0	79.3	86.2	96.6
School 'D'	12	0.0	0.0	0.0	16.7	33.3
School 'E'	2	0.0	50.0	100.0	100.0	100.0
School 'F'	2	50.0	50.0	50.0	50.0	50.0
15 to 21 Years	**168**	**10.7**	**17.9**	**39.3**	**57.1**	**78.6**
School 'A'	95	5.3	12.6	35.8	53.7	80.0
School 'B'	27	0.0	0.0	18.5	40.7	63.0
School 'C'	29	37.9	51.7	75.9	89.7	96.6
School 'D'	5	0.0	0.0	0.0	20.0	40.0
School 'E'	9	22.2	33.3	55.6	77.8	88.9
School 'F'	3	0.0	0.0	0.0	0.0	33.3
22 to 28 Years	**133**	**3.8**	**7.5**	**28.6**	**55.6**	**78.9**
School 'A'	102	2.9	5.9	26.5	55.9	80.4
School 'B'	16	0.0	0.0	18.8	37.5	68.8
School 'C'	8	25.0	50.0	62.5	87.5	100.0
School 'D'	1	0.0	0.0	0.0	0.0	0.0
School 'E'	3	0.0	0.0	100.0	100.0	100.0
School 'F'	3	0.0	0.0	0.0	33.3	33.3
29 Years or More	**33**	**9.1**	**21.2**	**45.5**	**75.8**	**93.9**
School 'A'	25	4.0	16.0	44.0	80.0	92.0
School 'B'	3	0.0	0.0	0.0	33.3	100.0
School 'C'	3	66.7	66.7	100.0	100.0	100.0
School 'D'	1	0.0	0.0	0.0	0.0	100.0
School 'E'	1	0.0	100.0	100.0	100.0	100.0
School 'F'	-	-	-	-	-	-

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Table 3

Percent of Doctoral Faculty Whose Actual Salaries Are Below Projected Growth Salaries By Academic School and Rank

School By Rank	No. of Faculty	Percentage of Faculty At Each Growth Rate 1.0%	1.5%	2.0%	2.5%	3.0%
Professor	**243**	**2.9**	**6.2**	**18.1**	**41.2**	**67.5**
School 'A'	154	0.0	1.9	11.0	37.7	67.5
School 'B'	32	0.0	0.0	0.0	18.8	50.0
School 'C'	36	19.4	33.3	63.9	80.6	94.4
School 'D'	9	0.0	0.0	0.0	11.1	33.3
School 'E'	9	0.0	0.0	44.4	66.7	77.8
School 'F'	3	0.0	0.0	0.0	0.0	0.0
Associate Professor	**236**	**17.8**	**29.2**	**50.8**	**69.1**	**81.4**
School 'A'	135	9.6	23.0	51.1	74.8	89.6
School 'B'	32	0.0	0.0	28.1	40.6	56.3
School 'C'	41	68.3	82.9	90.2	97.6	100.0
School 'D'	11	0.0	0.0	0.0	18.2	36.4
School 'E'	12	8.3	33.3	41.7	50.0	50.0
School 'F'	5	0.0	0.0	0.0	20.0	40.0
Assistant Professor	**180**	**55.0**	**62.2**	**65.6**	**71.1**	**75.0**
School 'A'	107	57.9	68.2	71.0	75.7	78.5
School 'B'	30	23.3	26.7	33.3	46.7	56.7
School 'C'	30	83.3	83.3	83.3	83.3	86.7
School 'D'	6	50.0	66.7	66.7	83.3	83.3
School 'E'	3	33.3	33.3	66.7	66.7	66.7
School 'F'	4	25.0	25.0	25.0	25.0	25.0

Table 4

Departments with Over Fifty Percent of Their Doctoral Faculty Salaries Falling Below the 2% Growth Rate

Department	Number in Department	Salary Below 2% Growth Rate N	Percent
A - School 'A'	2	2	100.00%
B - School 'C'	2	2	100.00%
C - School 'C'	12	12	100.00%
D - School 'C'	20	20	100.00%
E - School 'E'	6	6	100.00%
F - School 'C'	13	12	92.30%
G - School 'C'	17	15	88.20%
H - School 'A'	14	11	78.60%
I - School 'A'	27	20	74.10%
J - School 'C'	27	20	74.10%
K - School 'A'	21	13	61.90%
L - School 'A'	32	19	59.40%
M - School 'A'	26	14	53.80%
N - School 'A'	15	8	53.30%

salaries.

Table 4 shows the departments where at least half of the faculty with doctorates have salaries below those associated with a 2.0% annual growth rate. These fifteen departments account for 174 (61.7%) of the 282 faculty members with salaries below this arbitrary growth rate. School 'C', with six of the seven departments appearing on this list, is disproportionately represented here. Over 46 percent of the faculty with lagging salaries are in these six departments, and represent over 75 percent of the faculty within School 'C'.

Snyder Method

Following the basic premise outlined in the 1992 study on salary compression by Snyder, et. al., analyses were made within each rank for each academic division. Salary comparisons were made within each rank using standardized average salaries and years in rank. Ratios were calculated for predetermined time-in-rank intervals by dividing the average salary of the faculty in the given time interval by the overall average salary of the faculty of the rank being analyzed within given academic divisions on the Oxford campus and for all faculty within rank on the branch campuses irrespective of department. Years-in-rank intervals were adopted depending on which rank was being used in the analysis. For assistant professors, the time intervals were 0-1, 2-4, 5-7 and 8 or more, because of the seven years to tenure rule. For professors and associate professors the intervals were 0-5, 6-10, 11-15 and 16 or more, due to the longevity that occurs within these ranks.

Figures 2 through 4 graphically display the following results of these analyses where ratios of 1.0 or greater indicate that the average salary of the faculty within the given years-in-rank increment is higher than the overall average salary for faculty in that school:

1. Full professors in Schools 'A','D' and 'F' and on the branch campuses have ratios that rise consistently as their years-in-rank rise (Figure 2), indicating progressively less compression.
2. For full professors with years-in-rank of 11-15 years (Figure 2), their ratios are below those who have been at full professor for 6-10 years in Schools 'B', 'C' and 'E'. That is, for the faculty in these schools, salary compression occurs after 10 or more years as a full professor.
3. Looking at associate professors who have been in rank for 16 or more years (Figure 3), they have consistently one of the lowest ratios in Schools 'C','D' and 'E'.
4. In Schools 'A' and 'B' and on the branch campuses, the ratios for associate professors rise as their years in rank increase, thereby showing an overall lack of salary compression within these divisions (Figure 3).
5. At the assistant professor level (Figure 4), faculty with less time in rank had higher ratios in Schools 'C' and 'F'. In School 'C', the assistant professors most recently hired are paid higher on average then those who have been in the schools from 5 to 7 years; for the School 'F'the new hires are paid more than those who have been in rank from 2 to 4 years.

As a follow up to the basic analysis, individual ratios were calculated using the overall salary in rank as the divisor. These data are then made available to the Provost, where actual salary, individual ratio and divisional ratio (for comparable rank and years in rank faculty within same division) are given for each school and branch campus at each rank. Attention may want to be focused on those

Ratio of Avg Salary at Years-in-Rank To Avg Salary Within School

Professors

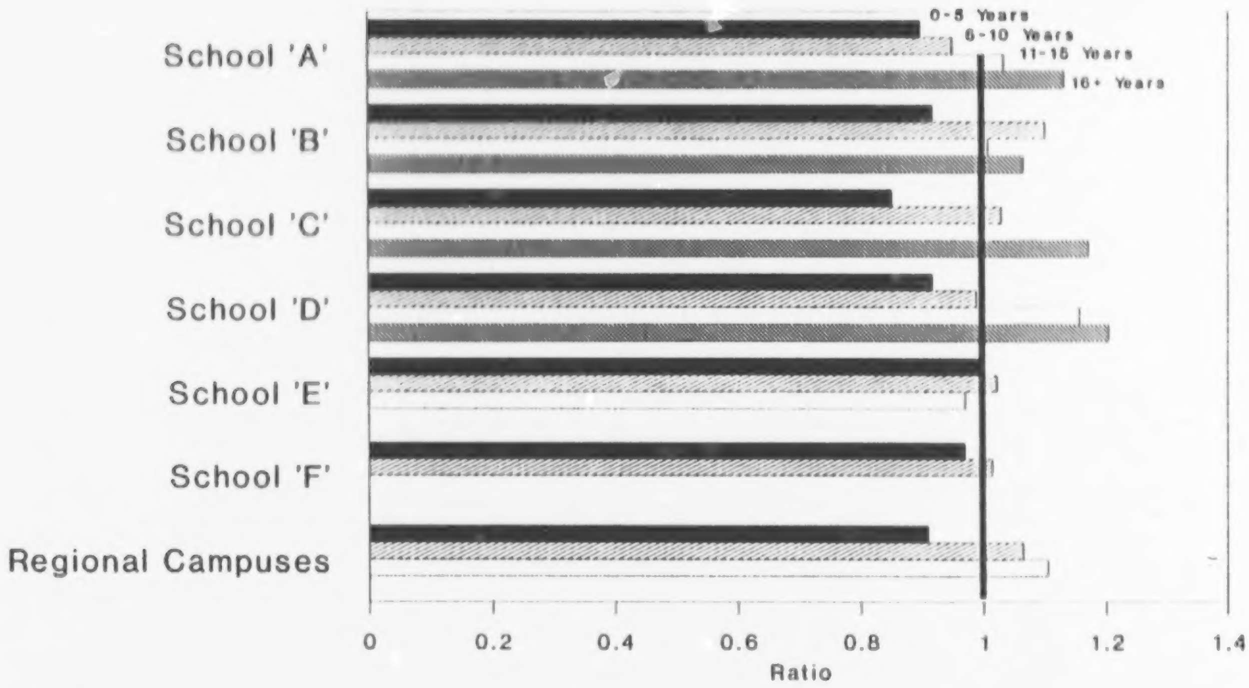

Figure 2

Ratio of Avg Salary at Years-in-Rank To Avg Salary Within School

Associate Professors

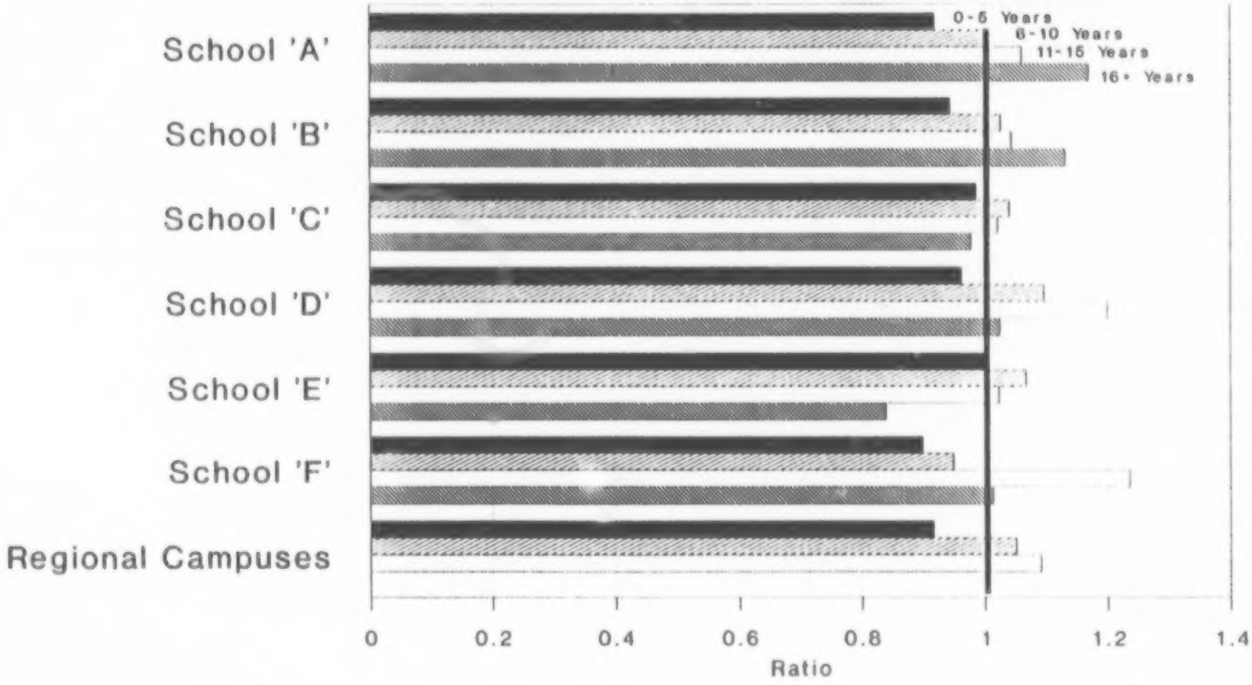

Figure 3

Ratio of Avg Salary at Years-in-Rank To Avg Salary Within School

Assistant Professors

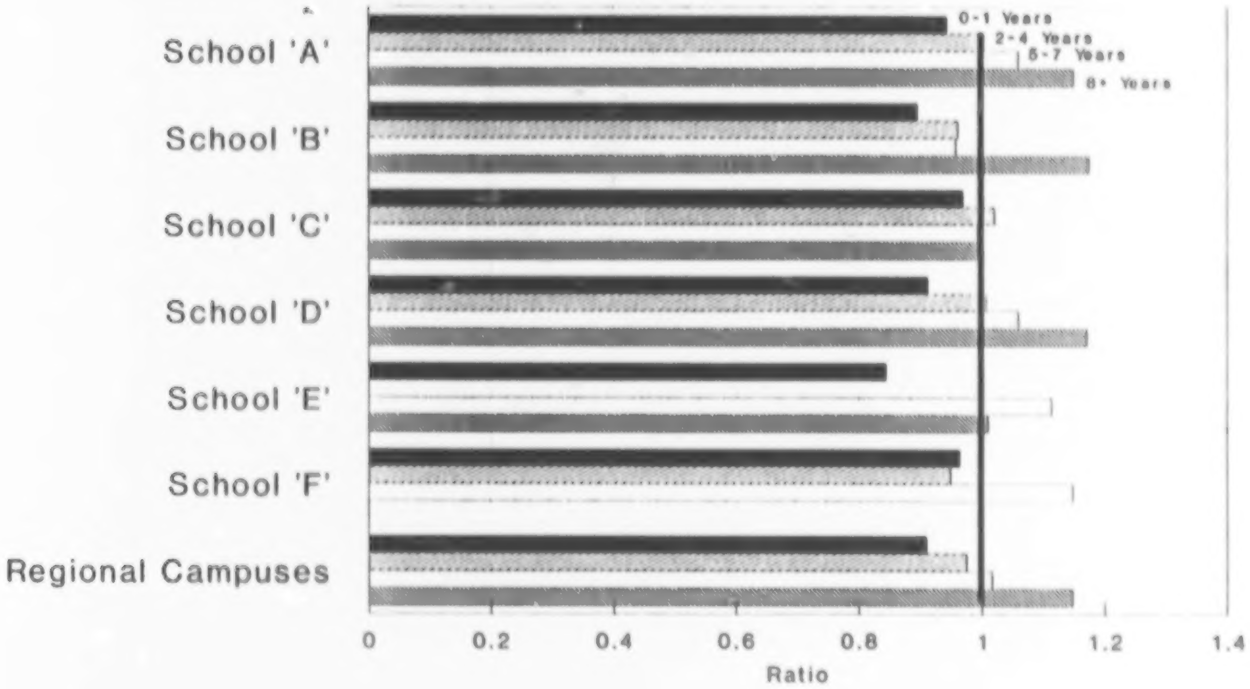

Figure 4

faculty who fall into the groups that displayed salary compression through the analysis using the second methodology and also those whose individual ratios fall below their group mean ratio which may be indicative of more pronounced salary compression. Of course, considerations must be given to not impacting individual merit increase decisions.

Conclusions

In the first method, where individual faculty salaries are contrasted to a hypothetical market salary that is then used in growth rate analysis, faculty are not separated by rank or years in rank to determine the extent of salary compression. Rather they are grouped together, allowing only for the inclusion of years since doctorate to define the presence of salary compression. In the second method, faculty are grouped by rank and years in rank to determine where salary compression may be occurring at this university. Because of these vastly different methods, results must be interpreted independently of each other and the conclusions drawn by each method must be weighed according to the appropriateness of the method.

For example, in both methods, faculty in School 'C' appear to be affected most strongly by salary compression. For the other divisions, it was dependent on the method as to whether there was substantiated evidence for salary compression.

Upon review of these two methods of determining salary compression, it is suggested that the first method discussed, which uses arbitrary growth rates and predicted salaries based on hypothetical new assistant professor salaries, be abandoned in future salary compression analyses. Perhaps a modification of the first method could be used which draws on actual salary increases to create a growth rate construct more reflective of what has actually occurred in the past. Although the literature on salary compression is extremely limited, over the next year we will attempt to discover other procedures for identification of salary compression beyond that of Snyder, et.al. (1992) and determine their appropriateness for implementation here.

A DEMOGRAPHIC AND ECONOMIC OUTLOOK FOR THE 1990'S

Selected Factors Affecting Westchester Community College and Higher Education in the 1990s in Westchester County and the Region

Westchester Community College

Marcia M. Lee, Ph.D.
Office of Institutional Research and Planning
July 14, 1993

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DEMOGRAPHIC AND ECONOMIC OUTLOOK FOR THE 1990'S

Selected Factors Affecting Westchester Community College and Higher Education in the 1990s in Westchester County and the Region

In serving the needs of higher education in Westchester county in the 1990s, several of the major factors to consider are located "off campus" in the Westchester community at-large. They are the demographic and economic trends already underway in many of the towns and villages in Westchester county and the nearby metropolitan region.

This report seeks to identify these factors and discuss them in terms of the planning that needs to occur at Westchester Community College in order to "be there" when the time arrives to serve effectively and adequately the educational needs of our perspective students.

POPULATION TRENDS

While the population of Westchester county (874,866 in the 1990 census) is expected to remain relatively constant through the year 2000, four significant shifts within the population are anticipated in this decade. They are:

1. **The continued increase in population in the northern section of the county with a continued decrease in the southern region.**

2. **The growth in the number and percentage of foreign-born residents, particularly Hispanics and Asians.**

3. **A striking change in the age structure as the county's population gets older.**

4. **An increase in the number of women entering in the labor force.**

(1) A SHIFT IN POPULATION TO THE NORTH

In the last two decades a gradual increase in population has occurred in the northern section of the county with a concomitant decrease in the southern region. Between 1980 and 1990 the population in the north increased by 19,990, while the population decreased by 15,023 in the south, a spread of almost 45,000 people. In the mid-section of the county the population remained fairly stable with an increase of 3,343.

With regard to these shifts several qualifications must be made. The decline in the population in the southern section of the county is slowing down. From 1970 to 1980 the population there decreased by 6.1%. Between 1980 and 1990, however, it decreased by only 3.5%.

At the same time, however, the growth in the population in the northern section of the county is increasing at an increasing rate, as shown in Table I. Between 1970 and 1980 the population increased by 5.0%. Between 1980 and 1990 it increased by 8.8%. In the middle section of the county, the growth rate is almost static with an increase of +1.6 between 1980-1990, having been preceded with a decrease of -4.6% in the previous decade.

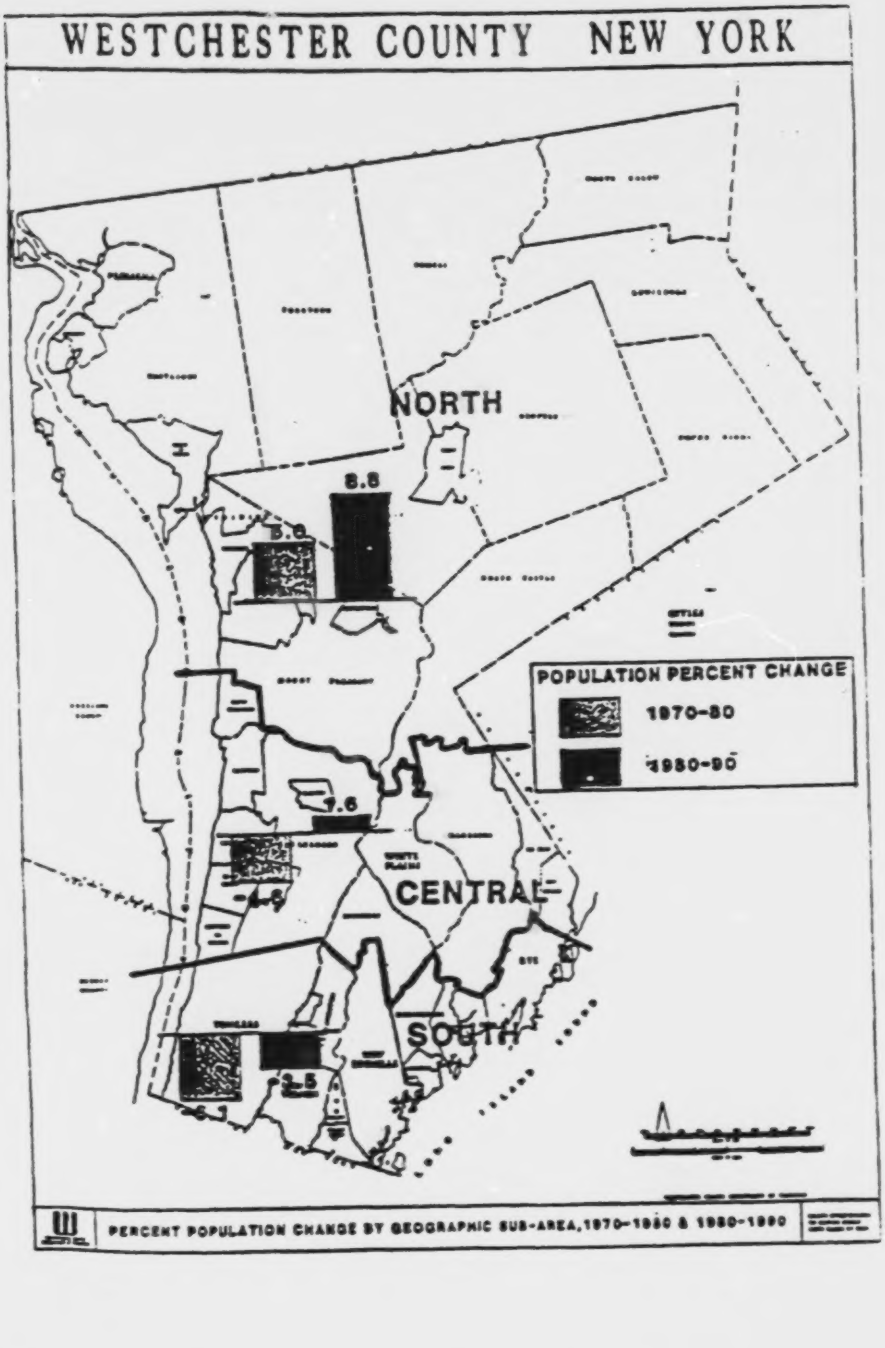
(2) AN INCREASE IN FOREIGN-BORN CITIZENS

While the shift in the population up county would indicate that the location of future off-site campuses should be placed in the northern section, such plans must also be considered in light of the students who attend WCC and those whom we are seeking to attract to the college.

In Fall 1992, 30% of our student body (full-time and part-time credit students) were minorities. This represents almost a doubling in the percentage of minorities at WCC over the previous decade. Of this group, Hispanics and Asians comprise almost half, with Blacks comprising the other half. Further increases in the number of foreign-borns, in particular, can be anticipated, given the aggressive admissions programs to reach high school students with minority backgrounds and the anticipated continued growth of this population in the decade ahead, especially among the Hispanic population.

To bring home the point, the foreign-born population of Westchester county increased from 126,866 to 158,597 during the 1980s, census figures show. Foreign-borns now represent 18.1% of the county. According to a six page

TABLE I


WESTCHESTER COUNTY NEW YORK
NORTH
8.8
5.8
7.6
-4.6
CENTRAL
SOUTH
2.5
-6.1
POPULATION PERCENT CHANGE
▨ 1970-80
■ 1980-90
PERCENT POPULATION CHANGE BY GEOGRAPHIC SUB-AREA, 1970-1980 & 1980-1990

special feature report in the Reporter Dispatch,* the growth of the Hispanic population is the factor primarily behind these large increases and is located primarily in southern Westchester.

> **They are Mexicans in New Rochelle, Cubans in North Tarrytown, Ecuadorians in Ossining, and Peruvians in Post Chester. From 1980 to 1990 Westchester's Hispanic population swelled 89.2% Natives of Latin and Central America and the Carribbean, including Puerto Rico, whose residents are American citizens now comprise 10% of the county.***

Moreover, another foreign-born group, those from **India,** increased by 143% mainly settling in New Rochelle, Yonkers and White Plains.

Blacks: It should be noted that Blacks continue to constitute the largest minority group in the county, but both the absolute and percentage increases were not as great as that of other racial groups in the past decade. Blacks now make up 13.7% of the total county population as compared with a 1980 percentage of 12.1%. This is a much smaller increase for this group than had been projected for Westchester.

In short, with the exception of two municipalities in the northern section of the county, Peekskill and Ossining, most of the foreign-born and minority populations are currently located in southern Westchester: Yonkers, Mount Vernon, and New Rochelle and Port Chester. **To the extent WCC seeks to serve this group, decisions must be made in light of the fact that this section of the student body and its future population growth are likely to remain in the southern section of the county.**

Racial Makeup by Age: Table II adds further pertinent information to college decision making in that it shows each race broken down by major age brackets. Hispanics (24.5%) and Asian (26.2%) had the largest percentage of people in the 0 to 14 Yrs age bracket (read future perspective WCC student), while whites (16.9%) and Blacks (22.9%) had the lowest. Planning that looks down the road more than five years, must take this into consideration.

---

* "A New Wave of Arrivals," Reporter Dispatch, Section E; Sunday, July 4, 1993, pp. 1-6.

(3) AGING OF THE POPULATION

In this decade the population will show a decided shift in age structure from young to older citizens. The median age in the county was 36.2 in 1990, an increase over the 34.5 reported in 1980 and an indicator of the continuing impact of the growing population 65 and over.

The under-35 age group is expected to shrink as more of the population shifts to the over-35 age category. The largest increase will be seen in the 40 to 55 year old cohort. The increase in the number of seniors will also be significant. This age group increased by 10.5% (11,867) in the past ten years and in 1990 represented 14.4% of the total population.

With the aging of the population will also come an increase in the percentage of women who comprise it. According to the 1990 census, the number of women exceeded the number of men by 44,306 or 5.1%. As the population continues to age, this percentage is expected to increase.

Baby Boom Echo: Despite the "aging" of the population, the greatest gain between censuses was registered by the under 5 (pre-school) population which showed a 22.7 % increase over the total from 1980. This is due to a steadily rising birth rate in the county since 1983, a phenomenon sometimes called the "Baby Boom Echo." Around 1997-1998, therefore, an increase in high school graduates in Westchester will be occurring.

TABLE II: WESTCHESTER POPULATION BREAKDOWN BY AGE AND RACE-1990

(4) AN INCREASE OF WOMEN IN THE WORKFORCE

Much of the recent growth in the last decade in Westchester's labor force has been due to dramatic increases in the number of women joining the labor force. In preparation for their joining the labor force, many women furthered their education at WCC. Since 1970, the percentage of women attending WCC full-time has gone from 31.7% to 49.7%. The percentage of women attending part-time has sky rocketed even more dramatically from 33.7% to 60.9%.

Demographic and labor force participation trends indicate that in the decade of the 1990s women will continue to join the labor force in growing numbers.* According to New York State Labor Department projections, the female labor force participation rate in the Hudson Valley Region is expected in increase from just under 56 percent in 1987 to slightly over 68 percent in the year 2000. As a result, the female share of the total labor force is projected to expand from 44 to 50 percent over the period making the percentage of females comprising the labor force equal to males.

Assuming women continue to return to school before joining the labor force, they will remain a significant pool of new student applicants for WCC. Skills and courses leading to professions particularly attractive to women living in the Westchester region should be in increased demand at WCC.

The New York Labor Department cautions that its projections assume, "barriers which hinder women from entering the labor force, such as a lack of child care and inflexible work schedules, will be removed."* By the same token, WCC must continue to remove these barriers, too.

Minority Group Members: At the same time white, non-Hispanic men will make up a smaller share of the labor force and minority group members will make up a larger share. The 1990 census showed that minority groups increased in the Hudson Valley Region by 43% (120,700) while whites contracted by 2% (26,000).**

Persons With Disabilities or Handicaps: Persons with disabilities will also increase considerably in the workforce. According to the 1990 census, approximately 81,600 residents 16-64 years of age in the seven-county Hudson Valley Region have a work disability.*** These individuals represent an large pool of potentially qualified job applicants for employers willing to utilize them. The ADA, which was signed into law July 26, 1990, and took affect in 1992, bars discrimination in employment and requires most employers to make reasonable accommodations for qualified employees with disabilities.

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* "Tomorrow's Jobs, Tomorrow's Workers, Hudson Valley Region, 1992;" New York State Department of Labor, Division of Research and Statistics, Binghamton, New York, page 3.

** Ibid., page 4.

*** Op.cet., pp. 5 & 6.

ECONOMIC OUTLOOK

A prime mission of Westchester Community College is to train the workforce of the county, both in basic academic skills, such as mathematics, reading, and writing, and in specific trades and professions such as nursing and accounting.

Corporate restructuring, cuts in Pentagon procurement, and government belt-tightening are producing a fundamental transformation in the Hudson Valley economic region which have already had serious implications for the economy and future job opportunities. They promise, also, to have serious implications for Westchester Community College, particularly in the types of courses that future WCC students will be demanding.

Updating the curriculum to meet the changed business environment of the 1990s in Westchester county will be essential if WCC is to keep attracting and serving the needs of students seeking higher education.

THE LONG-TERM ECONOMY

Westchester Community College is fortunate to be located in a county with a relatively favorable long-term economic outlook. According to the Office of Commerce and Economic Development of Westchester County, the county is poised for growth, although at a much lower rate than in the previous decade.* The number of jobs grew 15 percent during the 1980's, but the pattern of growth was not consistently positive. Employment did not grow at all in the late 1980s.

Because the 1990-1992 recession has taken its toll on jobs in the region, and because the Westchester economy is structurally similar and frequently interdependent with New York City's, county and regional economists anticipate that it will take some time before Westchester reaches previous employment levels and resumes a sustained economic growth. When it does, the landscape will have changed in terms of where employment opportunities exist for future WCC graduates.

Shift to Service Economy: The most pronounced change in Westchester's economy is a shift to the service economy accompanied by a decline in manufacturing activity, as shown in Table IV. Continuing a trend that began in the 1980's, future job generation will be concentrated in service-producing industries. From 1986 to 1991, employment in industries that provide services expanded by more than 33,000 or 5 percent in the Hudson Valley Region.

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* "Westchester Economy, Long-Term Highlights," a paper by Noreen Preston, Economic Development Specialist, Westchester County Office of Commerce and Economic Development, 1992.

Many of these services are labor intensive and require considerable training. Expansion in the service sector has been fueled, in particular, by a growth in health care facilities, and the need for services supplied by small and medium-sized businesses and law firms as larger companies downsize and use external services.

TABLE III: DISTRIBUTION OF JOBS BY INDUSTRY IN THE HUDSON VALLEY

The goods producing sector, comprised of construction and manufacturing industries, will continue to decline. Manufacturing payrolls, contracted 25,000 or 17 percent from 1986 to 1991. As a result, manufacturing now accounts for only a small share of Westchester's jobs, about 13 percent. One of the few industries showing some resiliency in this sector, however, is printing and publishing.

The finance, insurance and real estate industries, which have been growing rapidly in Westchester, have been facing major constraints in the 1990-92 recession. The long-term favors continued growth, but the next few years are likely to erratic.*

The government sector has maintained a relatively constant share of the county's jobs, approximately 15%. Government job increases have occurred slowly and steadily at the state level within the county, but local government predominates with many workers employed with school systems or other educational institutions.

The unemployment rate in Westchester is expected to be below most market areas in the metropolitan region. The long-term range should be between 3 1/2 percent and 4 1/2 percent.

THE JOB MARKET

According to the the New York State Department of Labor, an estimated 30,230 jobs are expected to be created from 1992 to 1996 in the Hudson Valley Region.* This should have a positive impact on the College and student enrollments.

The two main growth industries projected for the Hudson Valley region between 1991 and 1997, are Health Services and Business Services, as shown in Table IV. Jobs in the Professional Services area and Social Services area are also projected to grow, but not at the same pace as health services and business services.*

TABLE IV: PROJECTED GROWTH INDUSTRIES IN THE HUDSON VALLEY REGION*

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* "Tomorrow's Jobs, Tomorrow's Workers, 1992 Hudson Valley," New York State Department of Labor, Division of Research and Statistics, p. 11.

The two specific occupations expected to have the largest growth are home health aids with a projected increase of 25.6% or 2,100 people, and systems analysts with a projected increase of 25.3% or 800 people, as shown in Table VI. In both cases, these occupations appear to be well suited for WCC in terms of providing training and higher educational needs.

Not far behind these two specific occupations in terms of growth projections are medical assistants, medical secretaries, marketing, advertising, public relations specialists, accountants and auditors, and receptionists-information clerks. Table VI shows the anticipated percentage increase and net increase over the 1991-1997 period.

TABLE VI: PROJECTED LARGEST GROWTH OCCUPATIONS

Hudson Region Valley 1991-1997

	Occupation	Percent Change	Net Change
1.	Home Health Aids	25.6%	2,100
2.	Systems Analysts	25.3%	800
3.	Medical Assistants	21.4%	400
4.	Medical Secretaries	20.5%	500
5.	Marketing, Advertising, Pub. Relations Mgrs.	15.7%	500
6.	Accountants and Auditors	13.0%	900
7.	Receptionists, Information Clerks	13.0%	800

HIGH SCHOOL GRADUATES

As the percentage of students in the over-21 age brackets increase at WCC, the importance of the size of the high school graduate pool in Westchester, decreases. Nevertheless, this pool of applicants is still very important. In Spring 1993, 34% of the full-time students were in the 18-19 years category and another 26% were in the 20-21 category for a total of 60% of the full-time student body. The percentage of part-time students under 22 is far less (19%), but still significant.

In the last two decades, the number of high school graduates from Westchester schools has decreased from 14,389 in 1975 to 8,297 in 1991, as shown in Table VII. Were it not for the existence of two important factors, these figures would look grim, indeed.

The first factor is that beginning around 1997 the "Baby Boom Echo" will take effect, resulting in an increase in the number of students graduating from Westchester high schools. According to the U.S. Census, since 1983 there has been a steadily rising birth rate in the county, attributable to the fact that the baby boomers of the 1950s are of child bearing age.

The second factor of note is the very laudable track record that WCC has had since 1975 in steadily increasing the percentages of Westchester high school graduates who elect to attend WCC. The percentage has gone from 9.17% in 1975 to 15.9% in 1991, the latest year with available statistics.

If WCC can hold its "market share" or even increase it slightly during this decade, student enrollments will be enhanced. **The projected larger than average growth in Hispanics in the college age bracket would make this group a particularly important one to cultivate.**

TABLE VII: PERCENT OF WESTCHESTER HIGH SCHOOL GRADUATES ATTENDING WCC

COMMUTATION

Transportation improvements in Westchester County and the Hudson Valley Region continue to shorten the commutation time to Westchester Community College from various points throughout the metropolitan region.

Twelve major New York State Department of Transportation road projects are either underway or have been completed recently in Westchester as a part of the 1988 Rebuild New York Bond Act. Improvements on the Taconic State Parkway at the Hawthorne Interchange to Pleasantville Road, the Cross Westchester Expressway from from the Tappan Zee Bridge to Harrison and the Bear Mountain Bridge Road in Cortlandtd, in particular, will cut commuting time from points in the northern section of the county and beyond.

Other traffic management programs and organizations have become an integral part of the road improvement process in the county. **Metropool** offers commuter pool matching, distributes the Commuters' Register and sponsors van pools. **Metro Traffic Control**, the nation's largest traffic reporting service, has extended service to Westchester on a 24-hour, 7-day-a week basis. The **Shadow Trafffic Network** traffic information service covers road conditions, mass transit, congestion, hazardous areas, length of expected delays, and accidents for a 75-mile radius of the New York Metropolitan area. The **Westchester County Samaritan** currently sponsored by Texaco, patrols I-287 to aid disabled vehicles and assist in emergency situations.

In light of the major road improvements and increased traffic support systems which are reducing the commuting time, the geographical area served by WCC has been and should continue to be expanding in this decade. This is especially so for the Putnam and Dutchess county region.

Future plans for the College should include consideration of the special needs of students commuting long distances including:

1. Car pool matching
2. Two-days-a-week programs
3. Job market analysis of Putnam and Dutchess counties
4. The creation of a better home-away-from-home atmosphere.
5. College representation on Metropool and other traffic systems organizations.

EXECUTIVE SUMMARY

For purposes of strategic planning, several of the most important factors to consider are located "off campus" in the Westchester community at-large. This report identifies four factors, (1) Population Trends, (2) Economic and Job Market Trends, (3) High School Graduates, and (4) Commutation Trends, and discusses them in terms of their impact on the College in the future, particularly as it relates to the composition of the student body, and the location of off-site campuses.

Populations Trends: With regard to population trends in Westchester, four majors shifts within the county are projected to occur or already are occurring in this decade:

1. A continued shift of the population from the southern section of the county to the northern section.
2. A growth in the percentage of foreign-born residents, particularly Hispanics and Asians.
3. A striking change in the age structure of the county's population as it ages.
4. A continued increase in the number of women entering the labor force.

While the population is shifting north, growth in the Hispanic, Asian and Black populations continue to be centered in the southern cities of the county. Decisions in locating off-site campus, should take this into consideration.

Economic and Job Market Outlook: With regard to the economic outlook of Westchester, the college is fortunate to be situated in a county with relatively favorable, long-term growth prospects, although economists agree that the 1990-1992 recession will take time to come out of and the rate of growth thereafter will be much lower than in the previous decade.

According to the New York State Department of Labor, 30,230 jobs are expected to be created from 1992 to 1996 in the Hudson Valley Region. The two big growth industries will be in Health Services and Business Services. The specific occupations projected to grow the fastest are:

1. Home Health Aids (25.6%)
2. Systems Analysts (25.3%)
3. Medical Assistants (21.4%)
4. Medical Secretaries (20.5%)
5. Marketing, Advertising, Public Relations (15.7%)
6. Accounting and Auditors (13.0%)
7. Receptionists, information Clerks (13.0%)

High School Graduate Pool: While the college has diversified in the age of its students, the pool of high school graduates is still very important. A bright spot is on the horizon, here. Around 1997 the "Baby Boom Echo" will take effect as the baby boomers' children reach graduation age.

According to the U.S. Census, since 1983 there has been a steadily rising birth rate in the county, attributable to the fact that the baby boomers of the 1950s are of child bearing age. If WCC can continue its laudable track record of steadily increasing the percentage of Westchester high school graduates who attend the college (the percentage has gone from 9.17% in 1975 to 15.9% in 1991) or even remain constant, the increased high school graduate pool should result in increased enrollments.

Commutation Time: Transportation improvements in the Westchester county and Hudson Valley region continue to shorten the commutation time to Westchester Community College from various point throughout the metropolitan region. In light of this, the geographical area served by WCC should continue to expand in this decade.

Future plans for the College should include consideration of the special needs of students commuting long distances such as (1) car pool matching, (2) two-days-a-week programs, (3) job market analysis of Putnam and Dutchess counties, and (4) college representation on Metropool and other traffic systems organizations.

AN ANALYSIS OF ENTERING FRESHMAN SURVEY DATA AS IT RELATES TO GRADUATION RATES

Linda M. LeFauve
Research Associate

Mark L. Molnar
Senior Programmer

Office of Institutional Analysis
State University of New York at Buffalo

The State University at Buffalo has two campuses three miles apart, and is home to over 25,000 students, of whom more than 17,000 are undergraduates. Campus lore and anecdotal evidence indicates that a major problem students have with the university (parking and drop/add aside) is the feeling that they are "simply numbers," not individuals with individual backgrounds and expectations. Although this is not an uncommon perception among students at large institutions, the university is logically concerned that the college experience be a positive one during which students develop as individuals and members of a social organization. For that reason, an assessment of initial attitudes and expectations--particularly as they relate to changes during the college experience and the likelihood of students persisting to graduation --is an important part of the on-going research with the Office of Institutional Analysis.

Results of the Fall 1985 Annual Freshman Survey, given during summer orientation to freshmen entering the University at Buffalo for the fall semester, were analyzed with respect to the probability of students persisting at the university and obtaining a degree within five years. Items to be analyzed were selected on the basis of the potential of the university experience to impact on them in some way. Primary emphasis was placed on the following variables: students' concern about financing their college education; self-ratings on intellectual and social skills; reasons for going to college and expectations of the college experience; and further educational plans.

Concern over Financing Their Education. Students were asked to rate their concern about their ability to finance their college education. Generally, students with some or a major concern about finances were less likely to graduate within the time period included in the present study. Possible interpretations include (1) failure to graduate within the time period is directly related to financial concerns--e.g., because a student had to work part or full time and could not take a full course load, (2) students leave the university because of an inability to meet tuition or other expenses, or (3) worry over finances made it difficult to concentrate on studies.

Reasons for Going to College. Students who cited finding a better job as a very important reason for going to college were more likely to obtain a degree; the same was true for students who said that making more money was a very important reason for going to college. Less "pragmatic" reasons such as developing a philosophy of life or learning more about things that interested them did not appear to differentiate well between those students who attained degrees and those who did not.

Expectations of the College Experience. A larger proportion of students who indicated that there was a very good chance that they would change majors graduated within five years than was true of students who indicated that there was very little chance that they would change majors. It appears that expecting to be satisfied with college is correlated with the likelihood of obtaining a degree. Nearly 60% of the students who said there was a very good chance they would be satisfied had graduated within five years; about 56% of those students who felt there was some chance they would be satisfied, and about 45% of those students who believed there was very little chance of being satisfied, had graduated within the time period analyzed.

Highest Degree Planned. Students were asked about the highest degree they planned to obtain, and what they expected to be the highest degree earned here at the university. No definitive pattern emerged with respect to graduation rates. Analysis was then limited to the two categories containing the most respondents: those students expecting to earn bachelor's or master's degrees either here or elsewhere. Little difference was found at the bachelor level. However, students planning to obtain master's degrees at the University at Buffalo obtained a bachelor's degree at a slightly higher rate than students planning to earn a master's degree at another institution.

Self-Ratings. In general, students who rated themselves above average or in the highest ten percent in a variety of categories, compared to their peers, graduated at higher rates than those students who rated themselves near the bottom. We found the results of the analysis of students self-ratings to be most interesting, and so present them in greater detail.

Our research cohort was the group of first-time, full-time freshmen entering the university in the fall semester of 1985. Students were asked to rate themselves, relative to their peers, on a number of factors. These included: academic ability, artistic ability, drive to achieve, emotional health, leadership ability, mathematical ability, physical health, popularity, intellectual self-confidence, and social self-confidence. Response options were "Highest 10%", "Above Average", "Average", "Below Average", and "Lowest 10%." Confining ourselves to students who remained in good academic standing, we then analyzed the results of these self-ratings and the probability that a student would persist at the university and obtain a degree within five years.

There was no significant relationship between many of the self-rating categories and graduation. We did, however, find a statistically significant, positive relationship between graduation and five of the self-ratings.

Most of the students (nearly 60%) responding to the survey rated themselves as above average in academic ability. About a fifth (21%) rated themselves in the highest 10%. We found a significant relationship between students' perceptions of their academic ability and the probability that they would obtain a degree within five years. The relationship was linear: 65% of the students who rated themselves in the highest 10%, 56% of the students who rated themselves above average, and 49% of the students who rated themselves average obtained a degree. (Only three students rated themselves below average and none obtained a degree; no students responding to the survey rated themselves in the lowest 10% on academic ability.)

When asked specifically about mathematical ability, most students were a little harsher in their judgment. About the same proportion rated themselves in the top 10% (22%). A smaller proportion (40%) rated themselves above average, and larger proportions rated themselves average, below average, or in the lowest 10%. The proportions within each self-rating category were similar for the top two: 64% of the students who rated themselves in the top 10%, and 56% of students who rated themselves above average, obtained a degree within five years. For students who rated themselves average, below average, or in the lowest 10% the percentages with degrees were 55%, 48%, and 32%, respectively.

Nearly half of the respondents (48%) rated themselves above average in their drive to achieve, and nearly another fifth (19%) rated themselves in the top 10%. The relationship between self-rating and degree achievement was again linear: 62% of students in the highest 10%, 58% of students above average, 53% of students who rated themselves as average, and

35% of students below average had obtained a degree within five years. (Only three students rated themselves in the lowest 10% on drive to achieve, and one had obtained a degree.)

An interesting category related to degree attainment was emotional health. Nearly two fifths (39%) of the respondents considered themselves above average with respect to emotional health, and another two fifths (39% again) considered themselves average. Of these students, 62% and 54%, respectively, obtained degrees.Small proportions of the respondents rated themselves below average or in the lowest 10% with respect to emotional health relative to their peers (3% and 1%, respectively); of these, 35% and 36%, respectively, earned degrees.

The final category in which a significant relationship was found between self-ratings and degree attainment was social self-confidence. (Interestingly, intellectual self-confidence was not found to be significantly related.) The largest proportion (40%) of students rated themselves average; of these, 59% had earned a degree within five years. Of the 36% of the students who considered themselves above average in social self-confidence, 59% also earned degrees. Just over a third (35%) of the students in the lowest 10% obtained degrees. It is interesting to note that students rating themselves below average (11% of the respondents), in followed the groups rating themselves average and above average with respect to the proportion which obtained degrees (52%). Students who rated themselves in the highest 10% fared worse; 46% had obtained degrees within the five-year period assessed.

Table 1. Self-rating on academic ability by degree status.

Rating Category	Degree Awarded		No Degree	
	Number	Percent	Number	Percent
Lowest 10%	0	0%	0	0%
Below Average	0	0%	3	100%
Average	178	49%	186	51%
Above Average	643	56%	507	44%
Highest 10%	264	65%	142	35%
Total	1085	56%	838	44%

Table 2. Self-rating on mathematical ability by degree status.

Rating Category	Degree Awarded		No Degree	
	Number	Percent	Number	Percent
Lowest 10%	9	32%	19	68%
Below Average	68	48%	74	52%
Average	303	55%	249	45%
Above Average	431	56%	345	44%
Highest 10%	272	64%	152	36%
Total	1083	56%	839	44%

Table 3. Self-rating on drive to achieve by degree status.

Rating Category	Degree Awarded		No Degree	
	Number	Percent	Number	Percent
Lowest 10%	1	33%	2	67%
Below Average	19	35%	35	65%
Average	307	53%	274	47%
Above Average	532	58%	392	42%
Highest 10%	223	62%	134	38%
Total	1082	56%	837	44%

Table 4. Self-rating on emotional health by degree status.

Rating Category	Degree Awarded		No Degree	
	Number	Percent	Number	Percent
Lowest 10%	5	36%	9	64%
Below Average	21	35%	39	65%
Average	400	54%	336	46%
Above Average	465	62%	285	48%
Highest 10%	186	53%	163	47%
Total	1077	56%	832	44%

Table 5. Self-rating on social self-confidence by degree status.

Rating Category	Degree Awarded		No Degree	
	Number	Percent	Number	Percent
Lowest 10%	7	35%	13	65%
Below Average	109	52%	100	48%
Average	457	59%	315	41%
Above Average	402	59%	279	41%
Highest 10%	108	46%	127	64%
Total	1083	57%	834	43%

We were able to measure students self-ratings on these variables as they entered the University at Buffalo; we were also able to assess change in those ratings after four years at the institution. In the spring of 1989 a follow-up survey was sent to students who had participated in the initial survey during orientation prior to the Fall 1985 semester. The response was not what we had hoped--we had a return rate of just over 22%--due in large part to the fact that it was a mail survey addressed to what was, in many cases, a home address at which the student was unlikely to receive mail during the semester. Although we did not feel confident enough in the representativeness of the results to attempt further analysis (e.g., correlating change in self-ratings with graduation), we found that the changes recorded offered data on which to base speculation and possibly further study.

We found, for example, that there was negligible change as the result of four years on the university campus in several of the categories. Among these variables were artistic ability, drive to achieve, and emotional health. In other categories--academic ability and popularity--there was a small change. (The proportion of students rating themselves above average or in the highest 10% decreased between 1985 and 1989.) Students self-rating of their intellectual and social self-confidence both increased slightly, as did their assessment of their writing ability. The largest changes were in ratings of physical health, which decreased by more than seven percentage points; mathematical ability, which decreased by more than ten percentage points; and leadership ability, which increased by nearly eleven percentage points. Of these last three variables, only self-ratings of mathematical ability was originally found to be correlated with graduation rates.

Table 6. Proportion of students who rated themselves above average or in the highest 10%.

	1985	1989
Academic ability	84%	82%
Artistic ability	31%	31%
Drive to achieve	70%	69%
Emotional health	60%	60%
Leadership ability	50%	61%
Mathematical ability	67%	57%
Physical health	63%	56%
Popularity	41%	42%
Self-confidence (intellectual)	62%	67%
Self-confidence (social)	43%	47%
Writing Ability	54%	59%

Technical Background

The State University of New York at Buffalo's Office of Institutional Analysis (OIA) utilizes a networked micro-computer processing suite to perform its decision support function for university management. In their most basic form, the Annual Freshman Survey data are presented in a format favoring the analyst possessing the skills to utilize traditional mainframe processing resources. In addition, the data's multiple card-image per record format makes it difficult to merge with existing data base (DB) tables. (Typical micro-computer DB environments do not efficiently process such records). Integration of the Annual Freshman Survey data within the OIA's processing suite presented us with an opportunity to enrich our pool of source-data used to measure student behavior as well as a means to challenge our technical expertise. The methodology used was as follows:

1. Capture the raw data. The Annual Freshman Survey data for 1985 resided on 9-track magnetic tape media. (Starting in 1989, data was placed on standard 3.5" micro-computer diskette media). An IBM 3090 mainframe was employed to read the tape from its native EBCDIC format and place the results on temporary disk storage, still within the mainframe environment. Two files existed on the tape: the Annual Freshman Survey 1985 data file and the Annual Freshman Survey 1985 SPSS command file (SPSS is a very powerful statistical analysis package found on many different processing platforms. The inclusion of a command file on the tape obviated the need for the researcher to define variables within the data file; this was done by the command file). Both files were read from the tape. Upon completion of read operations, both files were captured for usage in OIA's micro-computer environment utilizing ethernet linkages and FTP. (Conversion of the character set from EBCDIC to ASCII was performed automatically via FTP). At the end of this session, two files resided on OIA's networked server's drive: AFS1985.DAT and AFS1985.SPS (containing the raw data and SPSS variable definition commands respectively).

2. Load data into a temporary data base table. For this application, OIA utilized RBase as the primary DB vehicle to perform much of the Annual Freshman Survey data capture operation. As indicated, the Annual Freshman Survey data file's multiple card-image per record format (see Figure 1) presented a problem if it was to be linked to existing OIA DB tables. This is because, in a multiple card-image file, many rows of data make up one record. (In the case of the Annual Freshman Survey data file, five such images comprise one student's record). Each image contains a field denoting the image number (the Annual Freshman Survey SPSS command file specifies this as position 80). In a traditional SPSS file, each image may be read through a relatively simple command statement. However, within a micro-computer DB application, there is no easy way to perform this operation. OIA chose to define a temporary DB table corresponding to the basic 80 character image shown in Figure 1. The table, shown in Figure 2, contains enough positional definitions to identify each character of the image. As can be noted, the last DB field contains the image number captured from the file (field name "CARDNUM"). Also, fields six through sixty-five have been given "dummy" names, since this is the only means to provide a designation to each differing field occupying the same physical space within the card images. Since the data resides in a "fixed" format (each element always occupies the same place within an image), it is a relatively simple matter to specify where to capture the data from the file to place within each DB field. In execution, OIA utilized the RBase "Gateway" function, specified the field positions manually, and loaded the data into the temporary DB (AFS1985T). (Inspection of the data within this table would have produced an output similar to Figure 1).

3. Process data within the temporary table. At this stage, the Annual Freshman Survey data resided within the RBase DB environment. However, it was not in a form that could be easily utilized. What was desired was a method to reduce each record's multiple card-images down to one. In this manner, each student's Annual Freshman Survey responses could easily be linked to existing data collated from other sources (utilizing SSN as a key). To perform this operation, a second DB table was created. This table (AFS1985) contained all elements defined by the SPSS command file. To place data from AFS1985T within AFS1985, program code was generated to read each student's images from AFS1985T, integrate them into one, and place the result in AFS1985. Upon completion, all students had a single Annual Freshman Survey record containing 290 variables.

4. Merge with other data. OIA has developed a massive DB containing data relating to student enrollment patterns over time. This is termed the "Student Flow Model" (SFM). SFM, although something of a misnomer since it is not a model so much as a framework for storing entering student information, contains both static descriptive (ethnicity, gender etc.), and variable semester (class hours taken, QPA etc.) data relating to a given student for as many semesters as the student takes classes within the institution. In practice, OIA can generate enrollment patterns from SFM for just about any "cohort" (ex. asian transfer students from two-year public institutions who enter the University's engineering program). Also, OIA can capture mainframe-resident on-line data relating to a variety of study options via the ethernet network referenced in #1. We had determined earlier that inclusion of Annual Freshman Survey data within the SFM environment was a highly desirable course of action. Since the SFM contains over 140 student-related variables, merging these tables yields a pool of over 400 variables with which the researcher can analyze many aspects of student behavior. RBase, while not the most efficient DB package in terms of "horsepower", does perform such merges fairly easily. Accordingly, the Annual Freshman Survey data was merged with SFM data, and, in this case, graduation information not contained within the SFM to generate the final DB structure, AFS1985F.

5. Extract specific fields for analysis. Not all 400-plus items from the final merged table were required for the analysis outlined within this paper. In addition, the primary analyst conducting the study was more comfortable working with data in an xBase (FoxBase, DBase) DB environment. To facilitate her analysis, selected fields from within the merged file were converted and ported to an xBase DB format (AFS1985.DBF). The formal analysis of the data was then undertaken using FoxBase version 2.1 and SPSSPC version 4.1.

Figure 1: Annual Freshman Survey Individual Record Card-Image

```
RECORD #1                                                   IMAGE NUMBER

18880102  0925876281031124175111111111105002045431111216636321111111112211211211
18880102  0925876281111222111111131111213111231321132122222425555455554333133332
18880102  0925876282321301420647473432111122433141443332400000000000000000065143
18880102  09258762845622647848214150014422344322142223444144444444441332343111444
18880102  0925876283321121235542111111111111111112111111111111111111111221     5


RECORD #2

18880104  10744129410311251541121112111000533446571441100000000000000002222222111
18880104  107441294111123211111111311211211111213112221122423414344445321123332
18880104  1074412941112311660606483344231131243441111314311321121111133122266443
18880104  10744129445114615133113220012311433211121111113221414131311111411111444
18880104  10744129413211222351241211111111111111111111111111111111111111112121     5
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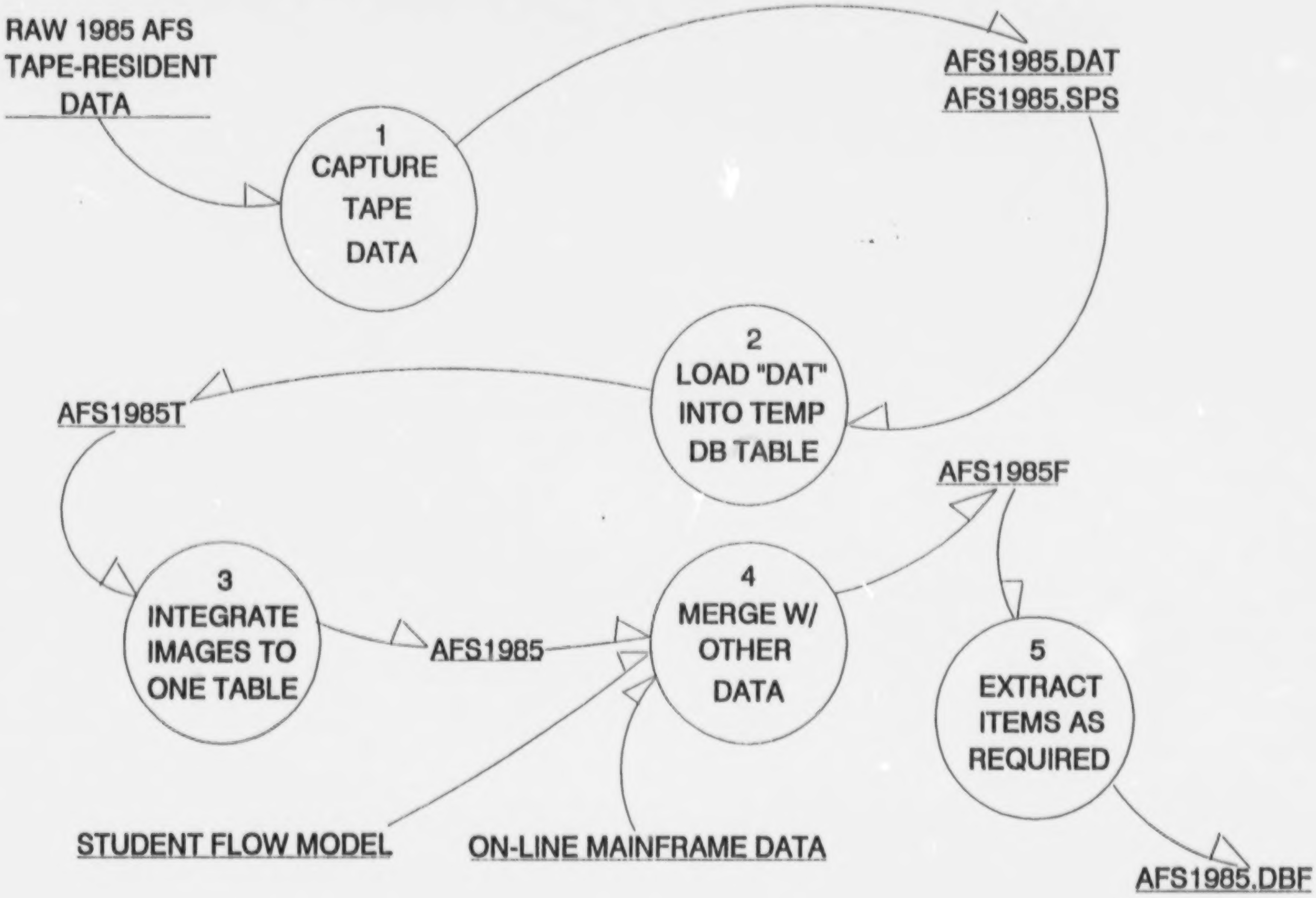
```
RECORD #N

99999999  999999999999999999999999999999999999999999999999999999999999999999999999991
99999999  999999999999999999999999999999999999999999999999999999999999999999999999992
99999999  999999999999999999999999999999999999999999999999999999999999999999999999993
99999999  999999999999999999999999999999999999999999999999999999999999999999999999994
99999999  99999999999999999999999999999999999999999999999999999999999999999999     5
```

Figure 2: Temporary DB Structure to Hold Annual Freshman Survey Card-Image

FIELD NAME	TYPELENGTH	
1 ACE	TEXT4 characters	
2 SHRED	TEXT2 characters	
3 GRPA	TEXT2 characters	
4 GRPB	TEXT2 characters	
5 SSN	TEXT9 characters yes	
6 F1	TEXT1 characters	
7 F2	INTEGER	
8 F3	INTEGER	
9 F4	INTEGER	
10 F5	INTEGER	
11 F6	INTEGER	
12 F7	INTEGER	
13 F8	INTEGER	
14 F9	INTEGER	
15 F10	INTEGER	
16 F11	INTEGER	
17 F12	INTEGER	
*		
*		
*		
*		
*		
*		
*		
*		
*		
59 F54	INTEGER	
60 F55	INTEGER	
61 F56	INTEGER	
62 F57	INTEGER	
63 F58	INTEGER	
64 F59	INTEGER	
65 F60	INTEGER	
66 CARDNUM	INTEGER	IMAGE NUMBER

CAPTURE AND INTEGRATION OF ANNUAL FRESHMAN SURVEY (AFS) DATA


RAW 1985 AFS
TAPE-RESIDENT
DATA
1
CAPTURE
TAPE
DATA
AFS1985.DAT
AFS1985.SPS
2
LOAD "DAT"
INTO TEMP
DB TABLE
AFS1985T
AFS1985F
3
INTEGRATE
IMAGES TO
ONE TABLE
AFS1985
4
MERGE W/
OTHER
DATA
5
EXTRACT
ITEMS AS
REQUIRED
STUDENT FLOW MODEL
ON-LINE MAINFRAME DATA
AFS1985.DBF

ANNUAL FRESHMAN SURVEY SPSS COMMAND FILE

```
FILE HANDLE CIRP1986
DATA LIST FILE=CIRP1986 RECORDS=5/
ACE1 1-4  SHRED1 5-6  GRP11,GRP21 7-10  SSN1 11-19
SEX 20  AGE 21-22 TWINSTAT,YRGRADHS,STATUS,NDEPPAR,NDEPCOL,HSGPA,
HSRANK,MARITAL,PREVCRED,CRED1 TO CRED4,NOCRED1 TO NOCRED4 23-39
HIDEGALL,HIDEGHRE 40-43 PLANLIVE,PREFLIVE,CHOICE,DISTHOME,NUMAPP,
NUMACC,AID01 TO AID21,DEPQ851 TO DEPQ853,DEPQ861 TO DEPQ863,
RACE1 TO RACE3 44-79  CARDID1 80/
ACE2 1-4  SHRED2 5-6  GRP12,GRP22 7-10  SSN2 11-19
RACE4 TO RACE7,CITIZEN,PARSTAT,DISAB1 TO DISAB8,ACT8501 TO ACT8526,
SLFRAT01 TO SLFRAT12,REASON01 TO REASON08 20-79  CARDID2 80/
ACE3 1-4  SHRED3 5-6  GRP13,GRP23 7-10  SSN3 11-19
REASON09 TO REASON11,FINCON,POLIVIEW 20-24  INCOME 25-26
FATHED,MOTHED 27-28 SCAREER,FCAREER,MCAREER 29-34
VIEWS01 TO VIEWS23,CHOOSE01 TO CHOOSE15,SRELIG,FRELIG,MRELIG,
HSSTUDY1 TO HSSTUDY4 35-79  CARDID3 80/
ACE4 1-4  SHRED4 5-6  GRP14,GRP24 7-10  SSN4 11-19
HSSTUDY5 TO HSSTUDY8,HRSPWK01 TO HRSPWK12 20-35 MAJOR 36-37
GOALS01 TO GOALS18,FUTACT01 TO FUTACT24 38-79  CARDID4 80/
ACE5 1-4  SHRED5 5-6  GRP15,GRP25 7-10  SSN5 11-19
FUTACT25 TO FUTACT26,PERMIT,OPTQ01 TO OPTQ10,FCAR01 TO FCAR18,
MCAR01 TO MCAR21,RESPRACE,NORMSTAT 20-73  CARDID5 80
COMMENT
```

(Additional lines follow but are omited for illustration purposes)

INTEGRATED ANNUAL FRESHMAN SURVEY TABLE

FIELD NAME	TYPE	LENGTH
1 ACE	TEXT	4 characters
2 SHRED	TEXT	2 characters
3 GRPA	TEXT	2 characters
4 GRPB	TEXT	2 characters
5 SSN	TEXT	9 characters yes
6 SEX	TEXT	1 characters
7 AGE	TEXT	2 characters
8 TWINSTAT	TEXT	1 characters
9 YRGRADHS	TEXT	1 characters
10 FULLSTAT	TEXT	1 characters
11 NDEPPAR	TEXT	1 characters
12 NDEPCOL	TEXT	1 characters
13 HSGPA	TEXT	1 characters
14 HSCRANK	TEXT	1 characters
15 MARITAL	TEXT	1 characters
16 PREVCRED	TEXT	1 characters
17 CRED1	TEXT	1 characters
18 CRED2	TEXT	1 characters
19 CRED3	TEXT	1 characters
20 CRED4	TEXT	1 characters
21 NOCRED1	TEXT	1 characters
22 NOCRED2	TEXT	1 characters
23 NOCRED3	TEXT	1 characters
24 NOCRED4	TEXT	1 characters
25 HIDEGALL	TEXT	2 characters
26 HIDEGHRE	TEXT	2 characters
27 LIVEPLAN	TEXT	1 characters
28 LIVEPREF	TEXT	1 characters
29 CHOICE	TEXT	1 characters
30 DISTHOME	TEXT	1 characters
31 NUMAPPLY	TEXT	1 characters
32 NUMACCPT	TEXT	1 characters
33 AID01	TEXT	1 characters
•		
•		
•		
•		
290 RESPRACE	TEXT	1 characters
291 NORMSTAT	TEXT	1 characters

ELECTRONIC SURVEY DATA ON GOPHER

Cynthia B. Lucia
Staff Assistant, Information Services
SUNY Potsdam College

A common chore of IR offices everywhere is filling out surveys such as College Board, Peterson's Guide, and Barron's. These surveys are usually completed, then forgotten until the next year. Yet how a college responds to these surveys could affect its image among high school students and counselors or even if the college gets lauded by Money Magazine or U.S. News and World Report.

At Potsdam College we are using client-server "freeware" called Gopher to "publish" the survey responses to the wider college campus community and beyond. We include both the quantitative data and the narrative about aspects of the college that is often asked for in the surveys.

By making survey response data accessible electronically to our campus community, it allows other offices to be more efficient in information-gathering, as well as providing consistent information. At present, four of our larger surveys (College Board, Peterson's, Barron's, College Counsel) have been loaded onto our Public Server which resides on the campus-wide network (LAN). From these surveys, we developed an electronic mini-fact book of statistics and narrative. The narrative is a composite of information taken from numerous College catalogs and brochures.

This mini fact book is available on Potsdam's Gopher and is now accessible to anyone who cares to look, anywhere in the world, with access to Gopher. It is located under Academics and Administration, Departments and Offices, Information Services. Within that file there are 21 separate files by subject, such as Admissions, Financial Aid, Undergraduate Majors, Athletics, Computer Services, Libraries, and so on. There is also the ability to "archive" the files from one year to the next, so that data could be compared for trend indicators.

Our campus is multi-platform, and although most faculty, students and some of the administrative offices use MAC, our library, several academic departments, our business office, and human resources use DOS. Some areas use both. Our Public Server, accessible through the campus network, is available to MAC users only, and thus limits what DOS users can access. Gopher shows promise in providing a solution to our multi-platform compatibility problems.

Formatting of material to be networked is another factor to be considered. Everything loaded on Gopher must be in text, thus tables, charts, and spreadsheets cannot be made available. The mini fact book is designed to be converted to text and is suitable for Gopher. However, our surveys, even using text with layout, do not convert to a readable format. Consequently, the mini fact book is on both Gopher and our local Public Server, and the surveys are on the local Public Server only.

Knowing that survey responses might impact recruitment, public relations, or whether we get chosen by US News, how often do we get involved with or seek input from college relations offices, deans, vice presidents, admissions officers, and career services. Our plan is to send email to these offices, maybe once a year or so, and ask them to check into our networked folder to review what we are saying about Potsdam College.

Publishing this information on the Gopher server has three advantages: first, anyone who is writing a report, making a speech, or completing another survey has this wealth of information that they can pull down onto the wordprocessor on their desktop computer; second, the IR office can, with minor editing, complete next year's survey in far less time; and third, the quality of the narrative information is much enhanced due to the multiple perspectives contributing to the prose.

"How Insensitive Can You Get?" Further Analysis of the Best Colleges Rankings

Michael McGuire
Franklin & Marshall College

Abstract

At the 1992 NEAIR conference, the author presented a detailed critique of the methodology that U.S. News employs in its annual Best Colleges rankings of colleges and universities, as well as the results of a survey on the weights used in those rankings. As a sequel to the 1992 discussion, the present session will feature the results of sensitivity analyses of the 1992 Best Colleges data for the National Liberal Arts category. Shifts in institutions' ranks were observed under three alternative weighting scenarios constructed from data obtained in a 1992 survey of college presidents, admissions directors, and academic deans. The implications of the Best Colleges model's instability for both the institutions affected by those shifts and the consumer audience will be discussed.

Introduction

The annual rankings of colleges and universities in the Best Colleges publication of U.S. News and World Report have prompted ample criticism from the higher education community. These criticisms cover a wide spectrum of issues, among which can be found the following:

- There is no absolute "best" college -- the fit between a given student's needs and an institution's strengths will determine which college is best for him/her.

- The measures used to define quality in the Best Colleges model tend to be weighted heavily toward wealth and prestige, deflating the rankings of less well-known and well-endowed institutions.

- The model is even less valid for institutions with non-mainstream missions.

- The measures used in Best Colleges are input- rather than process- or output-oriented; they are also reductionistic, blurring important nuances and ignoring the importance of an institution's *gestalt*.

- The scales used in Best Colleges are crude, and the weights assigned to measures are arbitrary.

- Falsification of data is believed to be commonplace, further reducing the validity of the resulting rankings.

- The U.S. News method places an uninvited and unwelcome data collection burden on participating institutions. U.S. News make significant profits from Best Colleges without compensating institutions for their assistance. Institutions that refuse to provide data for Best Colleges run the risk of being misrepresented, and potentially disadvantaged, in the rankings.

A study conducted at Franklin & Marshall College in 1992 attempted to shed further light on the validity of the weights used in the Best Colleges model and to elicit suggestions for improving it. Results indicated a moderate level of disagreement between the U.S. News weights and those recommended by college presidents, admissions directors, and academic deans. Since the U.S. News weights change from year to year, and since even ideal weights (however they might be determined) would not compensate for the other shortcomings of the model and its underlying premises, this disagreement may or may not be meaningful.

Of perhaps greater significance is the potential **impact** of different weights on an institution's ranking. Indeed, if different weights yield the same rankings, then the use of arbitrary ones might even be justifiable since they are by definition more efficient to formulate than empirical ones. If, on the other hand, different weights yield different rankings, the conscious use of arbitrary weights becomes problematical and may undermine the integrity of those rankings (other objections aside). The purpose of the present study was to seek an answer to this question by examining fluctuations in the Best Colleges rankings as a function of changes in the weighting scheme.

Method

Three alternative weighting schemes were applied to the 1992 Best Colleges data for National Liberal Arts colleges, supplied by U.S. News. The alternatives were derived from the aforementioned Franklin & Marshall study of weights recommended by college presidents, admissions directors, and academic deans. Weighting scheme 1 used the average recommended weights from the Franklin & Marshall study; the weights for schemes 2 and 3 were 0.5 standard deviations from those average weights, and counterbalanced so the total weights within a dimension totalled or approximated 100% (see Table 1).

The overall score and rank for each of the 140 National Liberal Arts colleges were recomputed using the alternative weighting schemes. The new ranks and quartiles were then compared to those derived using the U.S. News weights to determine the impact of variations in those weights -- the "bottom line" of Best Colleges, from an institutional perspective. The sensitivity of the U.S. News

Table 1
Weights of Different Models

	1992 US News	Alt Model 1 (1992 study)	Alt Model 2 (+/- .5 sd)	Alt Model 3 (+/- .5 sd)	sd
Selectivity					
High school class rank	35%	41%	34%	48%	14%
Acceptance Rate	20%	15%	10%	20%	11%
Average SAT	35%	29%	35%	23%	12%
Yield	10%	16%	21%	10%	11%
Financial Resources					
Educational expend/student	80%	Used Weight from US News	Used Weight from US News	Used Weight from US News	
Other expend/student	20%				
Instructional Resources					
% Faculty full-time	20%	15%	20%	11%	9%
% Faculty with PhD	30%	28%	23%	32%	9%
Faculty - Student ratio	20%	39%	44%	34%	10%
Average faculty salaries	30%	18%	13%	22%	9%
Retention					
Alumni giving rates	33%	32%	25%	39%	14%
5-year Graduation Rates	67%	68%	76%	60%	16%
Overall					
Selectivity	25%	22%	27%	17%	9%
Instructional Resources	20%	26%	22%	30%	8%
Financial Resources	15%	21%	17%	25%	8%
Retention	15%	19%	24%	14%	9%
Reputation	25%	13%	9%	17%	8%

rankings -- as defined here, their susceptibility to significant fluctuation as a result of relatively minor and empirically derived deviations from the published weights -- was thus measured.

Results

The results of this analysis are presented in Table 2. The sensitivity of the U.S. News rankings can be measured at a fine (i.e., shift in specific individual rank) or gross (i.e., shift in quartile, and thus Best Colleges cluster) level. A large percentage of colleges shifted one or more specific ranks in each of the 3 alternative models. Not surprisingly, those ranked originally in the 2nd and 3rd quartiles -- on either side of the median -- shifted more dramatically than those in the 4th and especially 1st quartiles. Colleges shifted an average of 5 positions using empirically derived weights that were typically only slightly different from those employed by U.S. News (Table 1). Two institutions shifted upward (i.e., improved in rank) by 24 positions when alternative weights were used; for them, obviously, the U.S. News weights are not fortuitous compared to the tested options. On the other end of the continuum, two colleges shifted downward (i.e., declined in rank) by 22 positions when alternative weights were used. Those institutions seem clearly to be favored by the U.S. News weights.

In terms of practical impact, only shifts in specific rank among the top 25 institutions are significant, since those are the only specific ranks that U.S. News publishes in Best Colleges. There was considerable movement within that group of colleges under all 3 alternative weighting schemes, though 24 of the 25 would have remained on this prestigious list under all scenarios. An average of approximately 22 colleges (16%) would have shifted into different quartiles and different sections of the published rankings, however, when the entire group of 140 institutions is considered. An alternative weighting scheme would have substantially benefited around 11 colleges, and disadvantaged 11 others, on the average.

Discussion

The present study attempted to determine the impact on institutional rankings of weighting schemes that were systematically different from the one used by U.S. News in Best Colleges. The alternative schemes were derived from a study on optimal weights and were based on the input of dozens of top administrators at the liberal arts colleges in question. In the final analysis, the alternative weights had a clear and consistent impact on the resulting rankings, for both specific ranks and quartiles. It does in fact matter what weights are used, which makes the arbitrary nature of the weights in the Best Colleges model all the more disturbing.

In many ways it is not surprising that the rankings are sensitive to fluctuations in weights; the latter are integral to the calculation of the overall score that

Table 2
Shifts in Rank and Quartile

Model 1		Changed Rank		Mean shift	Largest	Largest	Changed Quartile	
Quartile	N	#	%	in rank	upshift	downshift	#	Direction
Top 25	25	20	80%	1.52	5	-4	1	down
Rest of 1st	10	9	90%	3.40	8	-10	3	1 up, 2 down
Second	35	33	94%	6.20	15	-15	6	2 up, 4 down
Third	35	30	86%	5.37	24	-16	6	4 up, 2 down
Fourth	35	28	80%	3.83	15	-15	2	up
Total	140	120	86%	4.36	24	-16	18 13%	
Model 2								
Top 25	25	18	72%	1.16	4	-3	1	down
Rest of 1st	10	8	80%	3.00	9	-8	3	1 up, 2 down
Second	35	32	91%	6.14	9	-22	7	2 up, 5 down
Third	35	35	100%	6.66	24	-17	8	5 up, 3 down
Fourth	35	30	86%	5.20	24	-22	3	up
Total	140	123	88%	4.92	24	-22	22 16%	
Model 3								
Top 25	25	20	80%	1.76	5	-5	1	down
Rest of 1st	10	9	90%	4.50	8	-10	3	1 up, 2 down
Second	35	33	94%	7.17	21	-21	8	2 up, 6 down
Third	35	32	91%	5.37	22	-19	9	6 up, 3 down
Fourth	35	31	89%	3.97	13	-7	3	up
Total	140	125	89%	4.76	22	-21	24 17%	
Composite								
Top 25	25	19	77%	1.48	5	-5	1	down
Rest of 1st	10	9	87%	3.63	9	-10	3	1 up, 2 down
Second	35	33	93%	6.50	21	-22	7	2 up, 5 down
Third	35	32	92%	5.80	24	-19	8	5 up, 3 down
Fourth	35	30	85%	4.33	24	-22	3	up
Total	140	123	88%	4.68	24	-22	21 15%	

determines the rankings. What is surprising is that this issue has not been researched before, with empirically justifiable changes in the U.S. News weighting scheme a logical consequence.

A related problem arises from the fact that U.S. News changes its weights periodically (though such changes are apparently not in direct response to research findings). Since changes in weights produce changes in ranks, all else bring equal, it is possible for a college to climb or slip in the Best Colleges rankings without any changes in institutional characteristics or the statistics that U.S. News uses to measure those characteristics. Institutions have an understandably hard time explaining such slippage to internal and external audiences when the institution's behavior, and its absolute and relative "quality" measures, remain unchanged. The proviso that consumers should not attempt year-to-year comparisons of rankings because of this instability in the model ignores the fact that many consumers will insist upon doing just that.

As stated in the Introduction, this problem with weights is only one of many that plague the U.S. News methodology. While a non-arbitrary weighting scheme would almost certainly benefit that methodology and improve the credibility of Best Colleges among knowledgeable consumers and college administrators, it would not address the myriad other concerns that have been voiced repeatedly about that report. The statistical sensitivity of the Best Colleges rankings to relatively minor fluctuations in the study's weights has now been demonstrated; in spite of overtures to the contrary, the sensitivity of its authors to the many other objections of the higher education community has not.

References

McGuire, M.D. and Morse, R. J. U.S. News and World Report's Best Colleges Study: Dimensions, Variables, Measures, and Weights. Panel session at the Annual Meeting of the Northeast Association for Institutional Research, Washington, DC, 1992.

U.S. News and World Report. Best Colleges. Washington, DC: U.S. News and World Report, 1991.

A Critical Multiplist Evaluation of Developmental Reading Instruction at Suffolk Community College

Anthony Napoli, Suffolk Community College and Department of Psychology
State University of New York at Stony Brook
Paul Wortman, and Christina Norman
Department of Psychology
State University of New York at Stony Brook

ABSTRACT

Three quasi-experimental studies are presented which lend support for the positive effects of developmental reading courses on reading comprehension levels of junior college students. Study 1 used a regression-discontinuity design to test the effects of the developmental reading course on overall grade point average. Standardized reading test scores were regressed against overall grade point average for students whose reading test scores either placed them in a developmental reading course or above the cutoff point requiring no placement. The regression findings for the classification variable showed a significant effect for group suggesting a positive direct effect of the developmental reading course on overall grade point average. Possible "mortality" bias was ruled out in Study 2 using a nonequivalent control group design. Study 3 used a single group pretest-posttest design to assess the effectiveness of the developmental reading course on improving reading comprehension skills. Significant pre- to posttest gains were found. These results form a critical multiplism indicating a positive overall effect for the developmental reading program.

A Critical Multiplist Evaluation of Developmental Reading Instruction at Suffolk Community College

To meet the needs of academically "under-prepared" entrants, colleges and universities throughout the country have implemented basic skills assessment and remediation programs. The goals of these programs are first to identify skills deficiencies and then, where indicated, to attempt to elevate reading, writing or mathematics skills proficiency to levels commensurate with the demands of college-level coursework through developmental or remedial courses. Currently, there is conflicting evidence on the effectiveness of these programs.

In a review of the reading skills assessment programs at three community colleges, McElroy (1985) reported that students completing a remediation program had a higher graduation rate than those students who were either diagnosed as not needing remediation and those who did not complete remediation. However, McElroy (1985) also found some conflicting results which complicate the relationship between assessment, remedial programs, and student success. At one community college, 50 percent of the students who did not complete the remedial reading course received a GPA of 2.0 or higher, while at another community college there were no differences in GPA or in credits earned to credits attempted between those completing and those not completing the remedial reading course.

Similar conflicting results have been found by Hodges (1981) at another community college. Students placed in the remedial reading classes did not necessarily achieve higher grades than others. These remedial classes seemed to benefit the poorest students the most (61 percent of those enrolled in the remedial classes received a 2.5 or higher GPA whereas only 40 percent of those students who did not enroll in the remedial course did as well). For the students who were below average, but not among the poorest readers, the reading course did not help in their chance of attaining a C average, but did help 10 percent of these students to achieve a B average. It was concluded that improved reading ability does not alone increase student success in other courses.

The developmental education program at Suffolk Community College (SCC) focuses on remediating reading, writing, and math skills to college levels. As part of the outcomes assessment orientation and mission of the college, the developmental studies program is continually subjected to ongoing evaluation efforts to measure its effectiveness. This paper describes a recent series of studies which focus on the developmental reading program at SCC.

The process of selecting courses at SCC follows the administration of a series of placement tests to assess basic skills levels. For the past five years the college has used the College Board's Computerized Placement Tests (CPTs; College Board, 1990) to identify students in need of reading remediation. Data on the SCC population reveal that the CPT Reading Comprehension Test (CPT-Read) has served as a reliable and valid assessment device for identifying students in need of some level of reading remediation. Specifically, the test developers report test-retest reliabilty to be equal to .90. for a sample of eighteen hundred examinees (College Board, 1990). Napoli (1991) and Napoli and Coffey (1992) obtained validity coefficient ranging from .50 to .63 when vailiditating the CPT-Read against other standardized measures of reading comprehension and performance in college level coursework

The developmental reading program at SCC consists of a sequence of two single-semester reading courses. The first course (Introduction to College Reading, RE09) was designed for students with low-level reading abilities -- that is, those with CPT-Read scores below 66, which has been equated to reading abilities below the eighth grade level (Napoli & Coffey, 1992). These students attend two semesters of developmental reading instruction. Students with assessed reading levels below college level but, above the eighth grade level (CPT-Read scores between 66 and 72), are only required to attend the second developmental course (Reading in the Content Areas, RE10).

The RE09 course description appearing in the SCC catalog, states that the objectives and goals are "to provide individual and small-group instruction in basic reading and study skills in order to develop a higher level of competence so as to assure success in subject classes and allow entry into RE10." The course description for RE10 includes the following statements: "designed for the student who needs to enhance basic reading skills necessary for successful completion of other content-area courses by developing students' ability to: read and study textbook materials effectively and discover main ideas in paragraphs; discover meaning through the use of absolute and conditional language; note details and make inferences; recognize structural devices in sentences and paragraphs; draw conclusions; outline and summarize; take notes from written and oral material; use proper form and style for research paper writing; develop vocabulary; prepare for and take exams; and develop study skills."

Remediation is achieved by a combination of factors. Class size in developmental education courses is limited to eighteen students, thus providing individualized attention and follow-up. In addition, developmental education students spend at least one hour per course per week in the academic skills center, where they receive one-to-one instruction and work with self-paced books, tapes and computer software programs.

The degree to which the developmental reading courses are achieving the desired level of remediation and fulfilling their objectives is the central focus of an ongoing evaluation. Since only quasi-experimental methods (Campbell & Stanley, 1966; Cook & Campbell, 1979) are appropriate to such an evaluation, a "critical multiplist" (Shaddish, Cook, and Houts, 1986) approach involving a combination of designs was employed to rule out rival hypotheses. This evaluation focuses on three recently concluded studies which were designed to assess the effectiveness of the developmental reading program. The first uses a "regression-discontinuity" design (Trochim, 1984) to examine the impact developmental reading courses have on a commonly accepted measure of college success, namely overall grade point average (GPA). The second study employs a nonequivalent control group design (Cook & Campbell, 1979), and compares developmental reading students to a sample of students with similar reading levels but who had not participated in the program. Study 3 employs a single group pretest-posttest design (Cook & Campbell, 1979) employing a standardized reading test.

Study 1

Sample

For the first study, two student cohort groups were identified from the college-wide master student data file. All students were selected from Fall 1988 through Fall 1991 entrants. One group consisted of those students who scored below the "cutting point" (i.e., CPT of 80) and were enrolled in a developmental reading (Dev.Read) course (n = 6433) at any time during the semesters of Fall 1988 through Spring 1992. The second group consisted of students whose CPT-Read Score was above the cutting point and who "tested out" of the developmental reading program (n = 6109). We refer to these students as the non-developmental reading (Non-Dev. Read) group.

Trochim (1984) provides an extensive review of how regression-discontinuity can serve as a design for program evaluations when randomized assignment is not feasible or possible, and where placement into a treatment occurs only for those subjects who fall on one side of a predetermined cutting point on a continuous interval scale. Seaver and Quarton (1976) employed the regression-discontinuity model to examine the effects of dean's list awards, a non-randomized assignment, on grade point averages (GPA) in subsequent terms for a sample of college students. These investigators regressed term 2 GPA on term 1 GPA for dean's list and non-dean's students. The intercept at the dean's list cutting point was significantly higher than that of non-dean's list students who fell below the cutting point. This rise in the regression line at the dean's list cut point indicates the subsequent improvement or gain in academic performance associated with the award.

Earlier work with the CPT-Read test has shown it to be reliably related to end-of-term course grades (Ward, Kline, & Flauger, 1986). More recently Napoli, (1991), observed for a sample of 1,450 community college students significant correlations between the CPT-Read and Introductory Psychology final course grades ($r = .52$) and overall grade point averages ($r = .41$). If reading abilities could be significantly improved among program participants then their overall GPA would also be expected to shift or increase causing a regression-discontinuity between program participants and non-participants. Conversely, if the program has no effect on reading skills then the regression line for the program participants should not be displaced away from that of the non program students.

Results for Study 1

Statistical assessment of the CPT Read - GPA relationship, and an examination of potential regression-discontinuity between the student groups was tested employing the SAS general linear model procedure (SAS, 1988). In the first regression model GPA was simultaneously regressed on CPT-Read and the two-level class variable (Group) consisting of assignment to Dev. Read and Non-Dev. Read groups. Results for the analysis are presented in Table 1. As seen in the table, CPT-Read scores serve as significant predictors of overall GPA, $\underline{F}(1, 12539) = 502$, $p. < .0001$). Following Trochim, an examination of nonlinear higher order CPT-Read effects failed to produce any meaningful increments in R^2. The regression findings for the classification variable detected a significant effect for group, $\underline{F}(1,12541) = 49.3$, $p. < .0001$. An examination of the CPT-Read X Group effect failed to produce any meaningful improvements in R^2.

The significant main effect for the grouping variable indicates the presence of a significant regression-discontinuity (Trochim, 1984). To determine the nature of the regression-discontinuity, separate regression equations were created for each. In both cases CPT-Read was observed to be significantly related to GPA (see Table 2). Further examination of the regression constants show that the Dev. Read group has an intercept which is indeed higher than the Non-Dev. Read group. This difference, which is evidenced most noticeable at the criterion cut-point (see Figure 1), represents the regression-discontinuity between the two groups.

Within the regression discontinuity design Pedhazur (1982) points out that testing the difference between intercepts (regression discontinuity) is the same as testing the difference between adjusted means obtained in an ANCOVA. A statistical comparison of differences between adjusted means (intercepts) was conducted employing post hoc mean comparisons of CPT-adjusted GPA means (Pedhazur, 1982). Adjusted mean comparisons were assessed employing SAS generated Duncan t-tests. Results for the comparison (see Table 3) indicate the Dev.Read students achieved a mean adjusted GPA significantly above the Non-Dev. Read students.

Summary of Study 1

An examination of relationship between initial reading levels and subsequent GPA for a group of developmental reading students and a group of non-developmental students, employing a regression-discontinuity model, shows that the GPA of developmental students is significantly greater than what their pretest scores would predict. This finding suggests that involvement in the developmental reading program may be directly related to subsequent academic success as evidenced by the GPA gain. Numerous alternative explanations or threats to the validity of this assumption can be made, however. Chief among them is "mortality" or attrition (Campbell & Stanley, 1966). In this regard, it is possible that there is significant attrition among the remedial reading students, such that only the brightest enroll in or complete the program. If this were the case, then we would expect these students to be better than students with comparable reading levels, but who are not exposured to the developmental reading program. To examine this rival hypothesis study 2 was conducted.

Study 2

To rule out the "mortality" or attrition bias a third student group was identified from the college's master student data file. This group (n = 2210) consisted of those students whose CPT-Read score was below 80 but who were not placed into or enrolled in a developmental reading course. These students based on the CPT-Read score, tested into the developmental program but for various reasons were not placed into or enrolled in a reading course. We refer to this group as the Placed/Non-Attender group. The purpose for creating the Placed/Non-Attender group was to serve as a nonequivalent control group for the developmental reading group (Campbell & Stanley, 1966). These students, based on their CPT-Read assessed reading levels, are equivalent to the Dev.Read group, with one important exception, they had not been exposed to the reading program (the treatment). It is therefore expected that, if the developmental program is unrelated to future academic success, then it would have higher CPT scores than the Placed/Non-Attender's group that could be primarily attributed to mortality bias. Conversely, if the program is achieving its goals the Dev. Read group should be similar at pretest to the Placed/Non-Attenders, but should achieve significantly higher GPAs than their matched counterparts at post-test.

Results for Study 2

To assess initial reading level comparability between the two groups, CPT-Read pretest means were compared. Results for the comparison indicates that the Dev.Read students (mean = 67.1) and Placed/Non-Attender students (mean = 66.9) had comparable (t(8,641) < 1.0, p.=.76) initial reading levels. This is a critical finding since it indicates that prior to exposure to the remedial course-work, program participants (i.e., Dev.Read) and qualified non-participants (i.e., the Placed/Non-Attenders) had nearly identical reading levels. If the Dev.Read students had shown an initially higher reading pretest mean, then any subsequent between group GPA differences might be best attributed to an initial advantage among program participants or a selection bias, rather than programmatic factors. With nearly identical performances on the pretest measure, however, it appears quite justified to deploy the Placed/Non-Attenders students group as matched control group.

A comparison of the GPA means for the two groups indicates that the Dev.Read students earned a significantly higher (t(8,641)=20.7, p.<.0001) overall GPA in comparison to the Placed/Non-Attenders. The mean GPA for the Dev.Read students equals 2.40, whereas the mean GPA for the Placed/Non-Attenders' equals 1.93.

Summary of Study 2

The focus of the analyses presented above was to test for "mortality" bias as a factor contributing to the post-program academic achievements of the Dev.Read students. After identifying a matched control group, and confirming the success of matching, a comparison of GPA means for the Dev.Read students and the control group (i.e., Placed/Non-Attenders) revealed that the program participants earn significantly higher GPAs than control students. Since program participants achieve higher subsequent GPA in comparison to initially similar controls, however, we can rule out mortality bias as a plausible rival explanation.

Study 3

Results from Studies 1 and 2 suggest that exposure to the developmental reading program produces significant gains in academic performance among students who would otherwise perform at lower achievement levels. These long-term performance gains may be attributed to programmatic factors which enhance reading comprehension levels, but this conclusion requires a more immediate assessment of the Developmental Reading Program to be substantiated. From an evaluation perspective, determining the degree to which a remedial reading program accomplishes its immediate objectives, improving comprehension skills, can be achieved by: 1) identifying relevant parameters which would be sensitive to skills development; 2) selecting a sample of students to serve as reliable representatives of the developmental population, and 3) obtaining both pre-and post-instruction measurements on the relevant parameters. To this end, it is the practice of the college to conduct periodic posttesting, employing the CPT-Read on randomly selected samples of developmental students, to assess the degree of skills growth over the course of the term.

The rationale for selecting the CPT test to serve as a relevant parameter is supported by two lines of reasoning. First, (as stated above) , the test has sufficiently established reliability and validity to be accepted as a true measure of the construct (reading) it was designed to measure. Secondly, utilizing the same assessment tool on subsequent occasions allows for a direct assessment of change since the repeated administrations are made with the same measuring device.

Sample

The sample consists of 555-RE09 students, and 910-RE10 students attending randomly targeted classes between the Fall 1990 through Spring 1992 semesters. For both groups the pretest to posttest interval was approximately 16 weeks.

Results for Study 3

Data aggregated from the pretest and end of the term posttest administrations of the CPT-Read test (i.e., pretest to posttest comparisons for the two developmental reading courses) were examined. The results of the statistical comparisons (*T*-tests for correlated groups) between pretest and posttest CPT-Read means broken-down by developmental course (RE09 & RE10) appear in Table 4. These results indicate that significant pre-to post-performance gains were observed in CPT-assessed reading comprehension levels for students in both RE09 and RE10 classes.

Discussion

Employing a psychometrically reliable and valid reading comprehension test, significant reading skills performance enhancements were observed over the progression of the remedial reading courses. A statistically significant improvement from pre-to posttest, however, cannot be automatically interpreted as a meaningful or substantial improvement. It is, rather, a prerequisite for such conclusions. Only by an examination of the level and magnitude of gain following the detection of statistically significant movement in group means can such conclusions be drawn.

In a series of studies which focused on the criterion-related validity of the CPT-Read test (Napoli, 1991; and Napoli & Coffey, 1992), three points on the CPT-Read score distribution were identified to serve as reliable markers to: 1) identify students with reading comprehension levels commensurate with the demands of college-level course-work (CPT reading comprehension test scores above 72); 2) identify students with moderate comprehension-level difficulties who would benefit from RE10-level remediation (CPT scores between 66 and 72); and 3) identify students with more pronounced comprehension difficulties i.e., below eighth-grade reading level) who would be best placed into the RE09 format (CPT scores of 65 and below).

An examination of the mean posttest values appearing in Table 4 shows that on average the performance of the students in both groups was elevated to a proficiency level sufficient either to 1) move into the next level of developmental courses, as in the case of the RE09 students; or 2) "test out" of the developmental reading program, as the average RE10 posttest score indicates.

The findings from the three studies provide compelling evidence that exposure to the reading program produces meaningful enhancement in reading comprehension levels. It is unlikely that the observed reading performance improvements can be attributed to "mortality" bias since the results of Study 2 failed to detect that phenomena within the developmental population. Together with evidence provided from Studies 1 and 2 there appears to be convergent empirical or "critical multiplist" support to conclude that the developmental reading courses are indeed achieving their stated goals. Individually, none of these studies provides convincing evidence to link the remedial intervention to subsequent academic outcomes. A critical multiplist approach, however, provided sufficient convergent evidence to assess the programs impact.

As a final consideration, future evaluation efforts must continue to monitor the success of the developmental reading program in similar replication studies employing long-term outcomes. Ultimately, only through comprehensive longitudinal investigations can the full impact of the program be assessed.

Table 1

Analysis of Variance for the Regression of GPA on CPT Read and Group.

Source of Variance	df	MS	F
CPT-Read	1	390.2	502.6*
Group	1	38.3	49.3*
Error	14,748	.86	

* $p. < .0001$

Table 2

Regression of GPA on CPT-Read, for each Group.

Group	df	F	A - *Intercept*	*b.Regression Coefficient*
Non-Dev. Read	1, 6107	216.9*	.614	.021
Dev Read.	1, 6431	365.5*	1.596	.012

* $p. < .0001$

Table 3

Comparison of CPT Adjusted GPA Means for Developmental Reading Students and Non Developmental Students.

Group (N_{tot} = 12542)	Adjusted[1] Mean GPA[2] (SEM)
Non-Dev. Read (n = 6109)	2.39 (.016)
Dev. Read (n = 6433)	2.56 (.013)

[1] Means which are statistically adjusted for initial CPT-Read Levels.

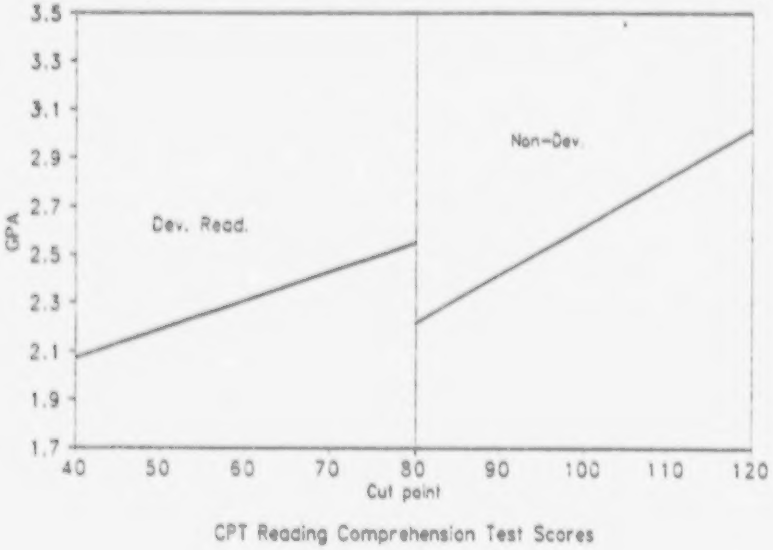
[2] All adjusted means in column significantly differ at the $p. < .0001$ level.

Table 4.

Comparison of CPT-Read Pretest and Posttest Means for RE09 and RE10 College-Wide Samples.

Developmental Class/N	Pretest Mean (SD)	Posttest Mean (SD)	Change Mean (Std Err) *T* Prob. <
RE09 N = 555	50.5 (9.4)	64 (14.8)	13.5 (.63) 21 .0001
RE10 N = 910	71.7 (8.9)	75.5 (15.4)	3.8 (.53) 7.24 .0001

Figure 1. Regression of GPA on CPT-Read. for Dev. Read and Non-Dev. Groups.



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Authors' Note

Anthony Napoli, Assistant Professor of Psychology and Statistics and Director of Institutional Research, Suffolk Community College. Specialization: Evaluation research, tests and measurement.

Paul Wortman, Professor of Psychology, Department of Psychology, State University of New York at Stony Brook. Specialization: Evaluation of innovatitive programs using new research methodologies.

Christina Norman , Doctoral Student, Department of Psychology, State University at Stony Brook. Specialization: Evaluation Research, Health Psychology.

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Inferential Research Methods in Educational Administration: Benefits and Limitations

Caroline L. Pike
Research Analyst, Institutional Research and Enrollment Planning
Ithaca College
Sharon L. Todd
Lecturer
S.U.N.Y. at Cortland

Introduction

The challenges faced by academic administrations are varied and range from student academic experience to financial and budgetary concerns. Most of the issues faced by adminstators are not easily resolved due to their multi-faceted nature and to the complexity of academic environments. One approach to resolving administrative concerns and determining policy might be to rely on theoretical frameworks and research literature which exists in the field of higher education, and then to look to internal data, such as survey responses, retention patterns, etc. to establish more specific plans based on information unique to the institution.

Institutional research offices often have access to institutional data which can be used to provide information for adminstrative questions. Because there are so many factors/variables which may potentially have influence in any situation, it is important that specfic effects can be isolated and measured. This paper will described how inferential statistical methodologies may be applied to existing data to address administrative issues. The benefits of such analyses in terms of information gained will be described, and the limitations in terms of statistical and practical value will be discussed. A specific example of how these methods were applied to an administrative project, and how results were interpreted, is given.

Background of Project

A college committee was formed to address issues relating to the freshman academic experience at Ithaca College. One of these topics focused on the possibility of developing a program or campus center with the purpose of assisting students with academic skills, i.e. study habits, test taking strategy, time management, etc. Several questions could immediately be raised: Should students be required to participate? If not, toward which students should the program be targeted? How might one predict which students are likely to be at risk with no prior knowledge of the students college academic performance? Is needing help with academic skills independent of indicators of general academic ability?

Use of Inferential Statistical Methods:
Benefits and Limitations

One way to provide information for questions such as these is to turn to statistical analysis of instituitional data. Such analyses can provide benefits in the information they provide, and yet may also be misleading if not interpreted appropriately. Additionally, the results of such analyses may be difficult to apply in practice. The following analyses will be used as an example in the discussion of the possible benefits of statistical analysis in providing useful information relevant to planning interventions, and as an example in discussing the limitations of such analyses in both statistical and decision-making frameworks.

Several sources of existing institutional data were used to address the questions described above. A pre-semester questionnaire asked students to indicate if they would like to receive help with academic skills. Admissions data, including SAT scores and high school class standing were also used. Finally, the QPA (quality point average) obtained by students at the end of their first semester was used in the analyses.

Benefits: Information gain from analyses.

First a series of t-tests were performed comparing the first semester QPA's earned by those students who indicated that they would like to receive help with academic skills, and the QPA's earned by those who did not request help. Table 1 summarizes the results of these analyses. The results indicate that those students who requested help with academic skills earned a lower QPA ($M = 2.779$) than those students who did not request help ($M = 2.929$; $t = 4.07$, $p < .01$). This would indicate that students who requested help have accurately diagnosed their potential academic weaknesses; that is, they believed that they would need help, and the first semester QPAs indicated that they, indeed, may have benefitted from academic skill help.

Further information is obtained when t-tests are performed on student subpopulations. When students are classified according to the five schools within the college (Table 1), the tendency for students who requested help to obtain lower first semester QPAs is present in every group with the exception of one (School B), and this one is not significant. The effect is significantly pronounced among students in School A (2.683 vs 2.830), School C (3.054 vs. 3.205), and School E (2.966 vs. 3.219). Excluding the possibility that these differences are not a function of these school categories, it may be useful to target these populations for any planned intervention, particularly if resources allow only limited intervention programming.

Second, analyses were performed in order to identify other variables which may be causing these observed differences in QPA, and to assess how these other variables might interact with "Request Help" variable in predicting first semester QPA. For example, there is sometimes a relationship between SAT scores and college QPA (Pascarella & Terenzini, 1991), so one might expect that SAT scores may be exerting some effect on the QPA results obtained here. In order to assess the separate effects of SAT performance and requesting help on QPA, students were categorized on the basis of their SAT scores and whether or not they requested help with academic skills. A series of ANOVA (Analysis of Variance) were performed, and the results are summarized in Table 2.

Consistent with the results of previous analyses, a significant main effect for "Requested Help" versus "Did Not Request Help" was identified, with those requesting help earning a lower QPA than those who did not request help (2.929 and 2.779 respectively; $F = 5.55$, $p < .05$). As expected, there was also a main effect for SAT score category, such that those students with higher SAT scores tended to earn higher QPAs than those students with lower SAT scores ($F = 34.87$, $p < .05$). One might hypothesize that SAT scores could be responsible for the differences in QPA obtained across help request categories; however, an ANOVA performed on QPA's and controlling for SAT scores, again indicated that students who requested help with academic skills earned lower first semester QPA than those who did not request help ($F = 5.09$, $p < .05$).

One might also expect that a students class standing upon graduation from high school (rank in high school class) would also show a relationship with first semester QPA in college. In order to determine if this was the case, and to determine if this relationship was responsible for the differences in QPA across help request category, several analyses were performed. First, students were categorized on the basis of their high school class rank percentile and whether or not they requested help with academic study skills. Next, a series of ANOVA were performed; the results of these analyses are summarized in Table 3.

As expected, there was a significant main effect for high school rank such that those students finishing higher in their class tended to earn higher first semester QPAs ($F = 78.31$, $p < .05$). Consistent with previous analyses, there was also a main effect for help request category, such that students who requested help tended to earn lower QPAs

(2.801) than those who did not request help (2.997; $F = 6.48$, $p < .05$), and this tendency was still present when controlling for high school rank ($F = 5.19$, $p < .05$). Most interesting, however, is the significant interaction between help request category and high school rank ($F = 2.93$, $p < .05$). In the two lowest categories of high school rank, those who requested help earned **higher** QPAs, while in the upper three categories those who requested help earned **lower** QPAs. This may indicate that those in lower percentile categories are underestimating their academic skills preparation. With respect to intervention strategies, it may suggest that students within the lower two quintiles who don't request help are more in need of assistance than those who do request help, although small within cell samples may limit interpretability in this analysis.

So, the application of inferential statistical techniques has provided useful information which may be used in the planning and development of student programs. First, we have been able to target students who may be in need of academic skills assistance; that is, it has been determined that students can accurately diagnose their need for help, and that this tendency is more pronounced for specific college subpopulations. Second, we have identified other indicators of academic ability which have some effect on first semester QPA; and, students are still able to determine their own need for academic help when controlling for the effects of these variables.

There are, however, numerous limitations in the application of such techniques. There are limitations in the information obtained from statistical analyses themselves, and there are also limitations in the application of results to administrative decision making and policy.

Limitations: Statistical and Practical

With respect to limitations in statistical inference, several concepts should be kept in mind. First, inferential methods are probability based and based on specific assumptions regarding the distribution of events; they do not provide certain or absolute answers. A significant result with a p value of less than .05 merely indicates that a difference of the indicated magnitude would occur **by chance** in fewer than five of one hundred similar samples, assuming that the difference in true population means is zero (Mohr, 1990). Second, one's chances of obtaining statistical significance increase as sample sizes increase (Winkler & Hays, 1975). It is true that a larger sample will produce a distribution more similar to the population distribution; however, a very large sample size may produce statistical significance when practical differences in group means are negligible.

There is also the issue of causality in the interpretation of results. In research of this type, there is little control over the variables of interest. As with archival or field research, one is often merely uncovering relationships among variables, rather than gaining the insight into causality of relationships which can be helpful in structuring interventions. The demonstration of relationships among variables does little to explain causal mechanisms among those variables. Finally, there are issues of generalizability. A sample should be randomly drawn from the population of interest, although in practice, this is often not the case. The extent to which this is not true lessens the generalizability of results obtained. It is important to make a determination regarding how representative the analysis sample is of the popoulation of interest.

Second, there are also limitations in the extent to which information obtained from such analyses can be easily applied in the context of decision making and policy. For example, in the allocation of finanical and human resources toward developing an academic skills center for freshmen, an administrator may be interested in specific indicators of payoffs and losses associated with actions. The probabalistic nature of statistical indicators, as well as possible problems with small or unrepresentative samples which may characterize research such as this, make a simple application of statistical results to resource allocation difficult.

Ultimately, too, individual and institutionalized values and goals will play a substantial role in decision making and policy. While analyses such as these may assist in targeting students and indentifying variables, they provide no simple rule for application. For example, one might conclude from the analyses described above that students who request help, and are in the School A, School C, or School E are best able to identify their academic weaknesses, and are the most likely targets for intensive assistance in academic skills. Given this scenario, other students who may benefit from such assistance are automatically excluded. While the approach is consistent with one system of values, excluding some students from a potentially enriching and beneficial program may be inconsistent with another set of values. So, while statistical analyses provide a means to describe "what is", the application of such information will be based on "what ought to be" (See Kendler, 1993 for a fuller discussion of this distinction).

Conclusions

In conclusion, inferential methodologies can provide useful information to administrators, and help to isolate pertinent variables and to measure constructs in concrete dimensions. Such information can lend itself to increased objectivity in decision making. On the other hand, care must be used in interpreting and applying the results of such analyses. Ideally, research results are interpreted in the larger context of an existing theoretical framework and previous research results; in practice, no such context may exist. In this vein, consideration of the limitations of statistical inference, and the values and goals of specfic organizations become increasingly important.

Table 1. Request for Help with Academic Skills: Means, cell counts, and t-values for all students and within School.

Population	Help Not Requested	Help Requested	t-value
All students	2.929 (593)	2.779 (916)	4.07**
School A	2.830 (264)	2.683 (449)	2.72**
School B	2.535 (54)	2.548 (102)	-.09
School C	3.205 (122)	3.054 (127)	2.19**
School D	2.906 (98)	2.887 (163)	.22
School E	3.219 (55)	2.966 (75)	2.37**

**p < .05.

Table 2. Request for Help with Academic Skills: Means, cell counts, and F-values for SAT groups.

SAT score	Help Not Requested	Help Requested	Total
< 850	2.571 (17)	2.614 (63)	2.605 (80)
850-949	2.654 (80)	2.567 (220)	2.590 (300)
950-1049	2.801 (189)	2.705 (273)	2.744 (462)
1050-1149	2.977 (164)	2.881 (217)	2.922 (381)
1150+	3.248 (139)	3.173 (141)	3.210 (280)
Total	2.929 (589)	2.779 (914)	2.838 (1503)

SAT main effect	$F=34.87$, $p < .05$
Help request main effect	$F=5.55$, $p < .05$
Help request controlling for SAT score	$F=5.09$, $p < .05$

Table 3. Request for Help with Academic Skills: Means, cell counts, F-values for High School Rank percentile group.

%ile Rank	Help Not Requested	Help Requested	Total
< 20th	1.184 (2)	2.407 (9)	2.184 (11)
21-40th	2.235 (24)	2.356 (71)	2.324 (96)
41-60th	2.582 (70)	2.476 (148)	2.510 (218)
61-80th	2.932 (135)	2.759 (207)	2.827 (342)
81st +	3.259 (230)	3.174 (260)	3.214 (490)
Total	2.997 (462)	2.801 (695)	2.879 (1157)

H.S. Rank main effect	F=78.31, $p < .05$.
Help Request main effect	F=6.48, $p < .05$.
Help Request controlling for H.S. rank	F=5.19, $p < .05$.
Help Request/H.S. Rank interaction	F=2.93, $p < .05$.

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ORGANIZATIONAL INFLUENCES ON DISPARITIES BETWEEN MALE AND FEMALE FACULTY SALARIES

Catherine E. Regan
Institutional Research Associate
State University of New York System

J. Fredericks Volkwein
Director of Institutional Research
and Adjunct Professor of Educational Administration and Policy Studies
State University at Albany

Introduction

The persistence of salary differences between men and women has been well documented over the last twenty years, and the focus of much of this research has been upon male and female faculty in academe. Early research in this area assumed a human capital perspective and examined differences in individuals' skills, experience and education (Johnson and Stafford 1974; Hoffman 1976). More recent research has focused on structural sources of earnings disparities, particularly the segregation of female workers in certain occupations and industrial sectors (Baron and Bielby 1984; Hodson 1984; Tolbert 1986). There has been a relative neglect in this literature of organizational-level analysis, even though most theorists agree that organizational structures have important influences on salaries earned (Stolzenberg 1978; Tolbert 1986). While acknowledging other determinants of salary policies and practices, the major focus of this research is on the contribution of organizational structure to gender-based salary differences in academic institutions.

Conceptual Framework

As Smart recently noted in his research (1991), the study of faculty compensation and gender equity has been guided by two theoretical perspectives: human capital theories and structural/functional approaches. Human capital theory encourages researchers to attend to those variables that reflect a person's utilitarian investment in educational credentials (such as doctoral degrees) and work experiences (such as research and administration) that yield a greater return or higher financial compensation (Johnson and Stafford 1974; Freeman 1976; Betz and Fitzgerald 1987). Structural/functional approaches, on the other hand, focus upon occupational segregation of women into academic disciplines and institutions that have lower prestige and compensation levels (Finkelstein 1984; Tolbert 1986; Youn & Zelterman 1988).

Earnings differences between males and females result from complex processes operating through individuals, institutions and their external environments (Bridges and Berk 1974, 231). From this perspective, academic salaries are determined by the interaction between individual faculty characteristics and credentials and the organizational context in which salary decisions are made (Stolzenberg 1978; Tolbert 1986). Faculty with comparable credentials and experience are expected to earn equivalent salaries if employed by the same institution in the same discipline. In other words, the benefits associated with academic employment are equitable if distributed equally to comparable faculty.

Organizational structures are influential in determining salaries because structures provide the arenas for organizational decision-making and operate as independent influences on salary decisions (Ranson, Hinings and Greenwood 1980; Hall 1991). The structures of an organization are the more or less permanent arrangement of organizational members in positions that influence the role relations among them (Blau 1974; Khandwalla 1978). This definition implies a division of labor and a hierarchy of authority that specifies, in varying degrees, the rules and regulations of how incumbents are to behave in work positions. Differences in structural characteristics become important contextual influences on organizational decision-making. As Hall (1991) observed, once the decision to expand an organization is made, the increased size influences subsequent decision-making and perceptions of alternatives available for responding to internal and external conditions and constraints. Thus, some variation in salary decisions is expected from differences in organizational structural characteristics, and organizations with different structural arrangements are expected to have variations in their internal salary allocation procedures. The wage attainment research provides theoretical and empirical support for the organizational determinants of salary differences

Organizational Structural Characteristics and Salary Allocation Decisions

Wage attainment theory and research suggests that organizational structural characteristics have important influences on salaries. Talbert and Bose (1977) applied Weber's bureaucratic characteristics and open systems theory to develop the notion that organizational structure influences salary variation. They reason that the higher the degree of environmental uncertainty involved in a job and the greater the degree of employee discretion, then the higher the employee's salary. Thus, to the extent that employing organizations differ in their degree of work routinization, interorganizational salary variations are expected. The same reasoning is applied to organizational subunits, units that manage environmental segments representing high organizational dependence, such as finances or personnel, are likely to receive a larger share of organizational resources, including salary (Talbert and Bose 1977). The more subunits managing the environment, the larger the number of personnel needed for coordination and the greater the extent of horizontal differentiation, one form of organizational complexity. The greater the degree of complexity exhibited by an organization, the higher the expected organizational salary level.

Stolzenberg (1978) relied on the organizational research linking size, work standardization, and structure. The greater an organization's size, the greater the work standardization, and the greater the effects of employee's schooling on their wages and achievement. The processes of wage attainment may be very different in large organizations from those in small or medium-sized organizations.

Baron and Bielby (1984) argued that work arrangements and labor market structures interact to influence environmental dominance and organizational complexity. Organizations confronting complex environments are favored when they adapt through internal complexity (size, structure, technology). The more complex the internal structure, the more successfully an organization has dealt with it's environment. Thus, larger and more structured organizations are better able to dominate their resource environments and to populate central segments of the economy while smaller, less complex and more vulnerable organizations occupy its periphery. The reward structures of less insulated, less complex organizations may be governed more by labor market forces and concerns for efficiency. The most influential characteristic in shaping work arrangements is organizational size .

Tolbert (1986) extends the environmental dominance and structural complexity perspectives by combining them with Becker's (1957) notion of discrimination as "preferences" (p. 227). Tolbert reasons that more dominant organizations are better able to attract and compensate members of a preferred group because these organizations are less driven by competitive pressures and have greater slack resources. Tolbert's research indicates that academic discipline and organizational size and wealth are good predictors of salary differences between male and female faculty. Her research suggests that salary allocation decisions may be different for males and females in larger, more affluent institutions, supporting the theory that preferences may be easier to sustain in institutions considered dominant in relation to other organizations in their environment.

Tolbert examined differences in average salaries for male and female faculty to reach these conclusions, but her study did not include a variety of relevant individual characteristics such as experience and highest degree earned. Thus, Tolbert was unable to document a clear link between organizational influences and salary disparities. The present investigation overcomes this limitation by including a wide range of individual human capital influences on salaries, in addition to various structural variables. Such research is needed if the above theories are to find support in academic organizations.

Organizational Influences from Higher Education Salary Equity Studies

In addition to the human capital and wage attainment research, a few studies of salary equity in higher education have collected data on structural and organizational level variables (Cohn 1974; Cox and Astin 1977), while others have included organizational influences along with individual determinants in their salary research (Astin and Bayer 1972; Darland et al. 1973; Bayer and Astin 1975; Barbezat 1987; Smart 1991).

One of the first attempts at measuring gender salary inequities, considering both individual differences and differences in work settings, was the Astin and Bayer study (1972). Their sample of almost 6,000 faculty was randomly drawn from a national sample of 60,000 faculty representing over 300 institutions. The 33 salary predictor variables represented demographic characteristics, educational background, professional work activities, including productivity and characteristics of the employing institution. They obtained an R-square of .64 and found that the three most influential variables in determining academic salaries were rank, productivity, and type of employing organization. Women employed by large institutions made less money than comparable men at the same institutions, and women were more often employed at smaller institutions, thus accentuating the overall difference in salaries between males and females. When Astin and Bayer controlled for the individual differences in faculty credentials, they found a salary disparity of $1,040 (in 1968-69 dollars) between males and females.

Cohn (1974) argued that the observable differences in salaries by institutional type may be misleading since salary differences may result from some underlying organizational factors rather than from institutional type. He investigated 13 organizational variables, representing a larger class of factors affecting faculty salaries in a national sample of 204 institutions. The significant influences on salaries included organizational size, per capita income of the state where the institution was located, type of control, and student/faculty ratios. A surprising result was that the coefficient for university versus other types of schools was not significant, implying that once the other factors were taken into account, it did not matter what an institution called itself as far as salaries were concerned.

Similarly, in Cox and Astin's 1977 study of 1,300 organizations, the effects of being employed at a university were eliminated when organizational size was controlled. Their findings suggested that university faculty were paid more because they worked in large rather than small institutions. In addition to organizational size, organizational wealth, selectivity and percentage of graduate students positively influenced levels of faculty compensation. Results indicated that the percentage of women on a faculty negatively influenced faculty salaries, probably mediated, in part, by the concentration of women in smaller and less selective institutions (Cox and Astin 1977).

Darland et al. (1973) examined faculty salary differences for all faculty and separately for men and women by type of institution and by field using more than 25 demographic, education, experience, and productivity variables. Salary returns from experience were twice as great for men as for women. Men also gained twice as much from administrative activity than women (Darland et al. 1973). Controlling for qualifications and productivity, women tended to be underpaid on average by roughly $1500 annually (in 1969 dollars). The amount of underpayment was more pronounced in research universities and in the biological and physical sciences where salaries tended to be highest and the number of women were few.

Barbezat (1987) estimated the extent of salary discrimination at two points in time using national data from the Carnegie Foundation for 1968 and from the Roper Center for 1977. She found evidence that the magnitude of gender-based salary differentials may be declining. The regression results demonstrated a proportional salary advantage ranging from seven percent to thirteen percent for faculty employed by research and doctoral institutions over faculty members in the liberal arts colleges.

Tolbert (1986) examined several organizational influences on salary in a national sample of 309 public and private colleges and universities. She found evidence of occupational segregation of women into lower paying fields and institutions. Organizational size was the strongest predictor of salary levels for both males and females, but males benefited considerably more from working in larger institutions than did females. Similar effects were found for organizational wealth and selectivity. Tolbert's results indicate greater average salary differences between male and female faculty at larger, wealthier, and more selective institutions.

Smart (1991) applied a causal model to investigate gender equity in academic rank and salary using 1984 data collected by the Carnegie Foundation. Employing several variables reflecting both the human capital perspective and the occupational segregation perspective, he examined the direct and indirect effects of gender on academic rank and salary. Human capital variables (such as career age and highest degree) and structural variables (such as male dominated discipline) both proved significant. Gender had significant direct and indirect effects on rank and salary, but the indirect effects were much greater. "These findings illustrate the central importance of career age, academic rank, and the degree of male domination of academic disciplines as the primary variables through which gender indirectly influences salary attainment."(p. 520)

In a study of salaries at NASULGC institutions, Scott and Bereman (1992) documented the enormous influence of academic field on faculty salaries. In 1990, the lowest disciplines (such as education, letters, foreign languages and fine arts) had average faculty salaries that were 20% to 30% lower than the highest paid [male dominated] disciplines (such as engineering, business/management, and the sciences).

In sum, the organizational, wage attainment, and higher education literature all lend theoretical and empirical support to the influence of organizational and structural variables on salaries earned. Yet few recent studies have attempted to measure the size of the gender disparity attributable to organizational variables, while controlling for relevant individual measures.

METHODOLOGY

The present investigation of organizational influences on salary disparities proceeds in two phases, the first develops the individual and organizational predictors of academic salaries and the second phase examines their roles in predicting salary differences using single equation regressions. This study draws upon a 1987 database of 6,536 full-time faculty, 5,106 men and 1,430 women, in 19 institutions within a single system of public higher education: two universities without medical schools, two universities with medical schools, seven comprehensive colleges, two baccalaureate institutions, two medical schools, and four multiprogram two-year institutions.

Limitations

There are both advantages and limitations in having sample organizations from the same state university system. While this limits the organizational and geographical diversity of the institutions, it also reduces unwanted variability in faculty compensation, such as fringe benefit packages and cost of living salary increases. Thus, any salary differences in this study are more likely to reflect true differences in real compensation than is usually the case in such studies. However, the effects of organizational isomorphism are expected to produce structural similarities among the sample institutions, thus reducing organization-based male/female salary differences.

Another limitation of the study is the lack of productivity measures for either teaching or research. To the extent that men and women collectively differ in their academic productivity or any other salary determinant omitted from the analysis, then some of the variance attributed to the independent variables, including sex, may be a function of these factors. However, it seems reasonable to assume that, in the aggregate, research and teaching productivity are distributed equally among comparable academic males and females.

If rank or any of the individual variables used to predict salary are biased, then the estimates of salary inequities in the present analysis are conservative, other things being equal. This condition appears likely since prior research indicates that academic women are promoted less frequently, offered less initial rank and less initial salary than men of similar credentials (Astin and Bayer 1972; Bayer and Astin 1975; Johnson and Stafford 1977; Ferber and Green 1982; and Smart 1991).

Phase One: Variable Development

Individual Determinants

We examined data collected by the state university system and identified an array of demographic variables, educational credentials, and work experience measures that were employed in the studies cited above. These include each faculty member's gender, age, race, highest degree earned and years since highest degree, length of annual contract, initial rank, current rank and years in current rank, past and current administrative experience including department chair status, total years of full-time and part-time service at the current institution, and total years of professionally relevant experience outside the current institution. The work experience variables, in particular, are rather comprehensive when compared to wage attainment literature and much of the salary equity research.

We classified each academic field by HEGIS discipline, rather than using the Biglan classification (1973) or some other framework. We chose to examine the effects of HEGIS discipline on salaries because of its relevance to the public university system under study. (See Appendix A for the HEGIS Discipline groupings and note that Psychology is included with the social sciences.)

Organizational Size and Wealth and Complexity

Since wage attainment research found strong effects from both organizational size and wealth associated with salary differences (Stolzenberg 1978; Hodson 1984; Tolbert 1986) and suggested the importance of organizational complexity (Talbert and Bose 1977; Baron and Bielby 1984), this study of gender-based salary differences utilizes organizational size, affluence and complexity as measures of an organization's dominant position and predictors of male/female salary differences. The organizational literature refers to size almost exclusively as the number of organizational employees. In a critique of the organizational size and structure literature, Kimberly (1976) finds that more than 80 percent of the studies reviewed used the number of personnel as the only indicator of organizational size. However, the higher education literature frequently uses student enrollment as the preferred indicator of organizational size. The present study uses faculty FTE and student FTE as measures of organizational size, rather than relying solely on one or the other.

Organizational wealth appears conceptually distinct from student enrollment or faculty size, since it refers to the discretionary resources rather than the organizational members available to the institution (Hall, 1991). Blau (1973) conceptualized size and wealth as distinct in his analysis of faculty salaries in a national sample of academic departments. Volkwein (1986) found that student enrollment and faculty size occupied a different factor than various financial and wealth measures in his study of public universities. Moreover, both Hodson (1984) and Tolbert (1986) found that organizational wealth influenced the internal salary allocation processes differently for males and females. The present study estimates the differences in organizational wealth by three 1987 variables: total educational and general expenditures and transfers per FTE enrollment, total sponsored funds research expenditures per FTE enrollment, and total library expenditures per FTE enrollment.

There is some controversy in the literature regarding the relationship between size and complexity. (Blau and Schoenherr 1971; Blau 1973; Hall 1991; Hall, Haas, and Johnson 1967; Argyris 1972) In his study of public research universities, Volkwein (1986) found that measures of size and complexity occupied the same factor. The structural concepts of size and complexity are often related, but since organizational complexity is reflected by the division of labor, job titles, multiple divisions and hierarchical levels, complexity appears conceptually distinct enough to warrant separate analysis (Hall, 1991).

The greater the number of occupations and the longer the period of training required, the more complex the organization (Hage 1965). Academic institutions vary in the number of specializations offered and the length of time required for faculty training in these specialized areas. Consequently, these institutions differ in complexity as measured by the number of degree programs and the highest degree offered. Another dimension of complexity along which academic organizations can vary includes horizontal differentiation, the number of different subunits and divisions (Blau and Schoenherr, 1971; Hall, 1991). The larger the number of academic colleges, schools and academic departments on campus, the greater the horizontal differentiation, increasing the need for vice-presidents and deans and other coordinating personnel. Structural complexity in the present study is estimated by three variables: highest degree offered at an institution, the number of department chairpersons and the number of vice-presidents and deans.

An examination of the intercorrelations among the organizational variables revealed that several organizational variables are highly related, so a principal components factor analysis was used to reduce variable redundancy. Table 1 shows the results of the factor analysis which condenses the data from the original eight variables to three organizational factors: wealth, size and complexity. These factors retain 96.5 percent of the original variability and are superior for subsequent analysis due to their reduced intercorrelations. Two of the original three complexity measures, highest degree offered and number of department chairs, loaded on the size and wealth factors, indicating a closer degree of association with organizational size and wealth than with complexity.

TABLE 1: Factor Analysis

Organizational Variables	**Factor 1 Wealth**	**Factor 2 Size**	**Factor 3 Complexity**
Research Expend./FTE Student	**.9968**		
Ed. Expend./FTE Student	**.9899**		
Library Expend./FTE Student	**.9552**		
Highest Degree Offered	**.6627**	**.5685**	
No. of Department Chairs		**.9699**	
FTE Enrollment		**.9640**	
FTE Faculty		**.9609**	
No. of Vice-Presidents + Deans			**.9608**
Percent of Unique Variance	**48.8%**	**38.0%**	**9.7%**
Joint Variance	**48.8%**	**86.8%**	**96.5%**

Note: Factor loadings are rotated (varimax) and loadings below .30 not shown.

The organizational measures were averaged and summarized by NCES institution type revealing that the two medical schools exhibit the highest organizational wealth, the doctoral universities with medical schools are the largest in size, and the doctoral universities without medical schools have the greatest organizational complexity.

Phase Two: Analysis of Predictors of Academic Salary

Multiple linear regression is the standard approach for determining the presence or absence of gender-based salary differences (Scott 1977; Allard 1984; Johnson, Riggs and Downey 1987; Geetter 1988; Moore 1993). Single equation regressions are used to investigate the individual and organizational sources of faculty salary differences because the effect of each independent variable is estimated with controls for the other variables. Multiple R-square and the unstandardized beta weights associated with the independent variables estimate the total salary variance explained by the model and the average contribution of each variable to annual salary. The unstandardized regression weight associated with the sex variable estimates the average gender-based salary inequity.

The three organizational factors along with three interaction terms are included in the regression equation to assess the organizational effects plus any secondary effects associated with the structural factors and female salaries. The magnitudes of the beta-weights and significance levels of the interaction terms are examined along with changes in the partial or main effects of the organizational structural factors and the sex variable. The R-square and R-square change statistics are used to evaluate the relative contributions of the individual and organizational variables to gender-based salary differences. Finally, the organizational effects on salaries are converted to their dollar equivalents and the total salary disparity for female faculty is summarized by NCES institutional categories.

RESULTS

The study found that the 1987 average salary for the 1,430 female faculty was $36,942 compared to $47,922 for the 5,106 male faculty. Table 2 shows the impact of each variable group on the explained variance in average annual faculty salaries. Over 81% of the variance is accounted for by individual faculty variables, such as level of degree earned, academic discipline, initial and current rank, and administrative responsibilities. While the organizational variables, size, wealth, and complexity, explain 25 percent of the salary differences, their unique contribution to an increase in the explained variance (R-square change) is only 2.6 percent. When the organizational interaction terms are added to the equation, they increase the explained salary variance by less than 1 percent. The R-square change estimates the *unique* contribution of the organizational variables and, thus, is a conservative estimate. In addition, since these 19 sample institutions were selected from the same public university system, the effects of isomorphism tend to underestimate the organizational influences associated with salary differences.

TABLE 2
Estimated Regression Effects of the Variable Groups on Gender-Based Salary Differences

Variable Groups	R-Square	Regressions	Total Variance Explained	R-Square Change	Gender-Based Salary Differences
					-$10,980
1. Individual Faculty Variables	81.5%	1.	81.5%	81.5%	-$1,363
2. Organizational Factors	25.1%	1. + 2.	84.1%	2.6%	-$1,241
3. Organizational x Sex Variables	1.8%	1. + 2. + 3.	84.3%	.1%	-$659

The unadjusted male/female average salary difference of almost $11,000 is reduced to only $1,363 by the individual faculty variables. Adding the organizational factors after the individual characteristics to the regression has a small impact on the magnitude of the gender-based salary difference (-$122). When the interaction terms associated with the organizational characteristics are entered, nearly fifty percent of the remaining salary disparities are redistributed (-$1,241 to-$659). Thus, for the sample as whole, female faculty received $659 less than comparable males.

Table 3 presents the regression results for the 37 variables included in the final salary model. The first column of numbers in the table shows the relative dollar influence of each variable on salary controlling for all other variables. The most prominent influences on salary are: educational level, being in the fields of business and management, medicine, or science and math, holding a senior level initial or current rank, being on a 11 or 12 month contract, holding an administrative title, and being at a well-funded, large, or complex institution. Two variables, age and race/ethnicity were dropped from the analysis because they are not significant or introduce problems of collinearity. The race/ethnicity category "black, non-hispanic" was not stable during the analyses and not significant in the individual faculty characteristics model. Age is moderately correlated with salary, however, its influence is overshadowed by two other variables in the model, years since highest degree and total years of experience.

Controlling for all the other variables, this study found that the dollar value of being a faculty member at an affluent institution (one with a higher level of expenditures per student) in 1987 was $2,086. Faculty salaries at larger institutions are, other things being equal, $1,636 higher. The dollar value of faculty employment at institutions with greater numbers of vice presidents and deans was $1,688 in 1987. Thus, the three organizational factors together accounted for almost $5,411 in salary variance explained.

These findings, then, are consistent with other higher education and wage attainment research that found male and female faculty alike were paid more because they worked in large rather than small organizations and wealthier rather than less affluent organizations. It also provides evidence for larger pay associated with employment at more complex organizations.

As shown in Table 3, there are significant negative effects resulting from the interaction between the three organizational factors and gender. This means that female faculty tended to be paid $2,710 less than comparable male faculty in the wealthier, larger, and more complex institutions in the sample, controlling for the other variables in the analysis. Thus, the data suggest that salary disparities are unevenly distributed across higher education institutions.

To examine further the uneven organizational distribution of gender-based salary differences, the salary associated with each factor is estimated separately for males and females in the study. A difference factor score between them is calculated. These data are sorted by NCES institution type and the salary differences are presented in Table 4. The largest gender-based average salary disparity is observed at medical schools (-$4,652), followed by doctoral institutions with medical schools (-$3,033) and lastly, by doctoral institutions (-$2,007). In terms of dollars, there are mildly positive effects of the organizational characteristics on female salaries at the comprehensive ($369), baccalaureate ($251), and two-year institutions ($388). Thus, it appears that gender-based salary disparities in this particular state university system are not a system-wide "problem", but rather are more prominent at the medical and doctoral campuses.

Table 3: Individual, Organizational, and Organizational x Sex Interaction Effects on Salary

Multiple R = .91856 df = 32, 6503 Standard Error = 6269.25
R-Squared = .84375 F = 1097.37 N = 6,536

INDIVIDUAL CHARACTERISTICS (a)	beta (dollars)	SE.E.	P
Demographic:			
Sex	-659.08	227.06	.0000 *
Education:			
Less Than Doctorate	-2,098.75	247.77	.0000 *
Ed.D. or Ph.D. (b)	0		
Other Doctorate	5,547.45	396.54	.0000 *
Years Since Highest Degree	174.18	16.38	.0000 *
Business & Management	7,838.09	545.97	.0000 *
Health Related Professions	878.28	520.00	.0913
Arts & Sciences: Humanities	-1136.26	417.38	.0065 *
Medicine	6,913.05	620.95	.0000 *
Professional Programs	611.64	428.29	.1533
Science & Mathematics	2,232.06	429.65	.0000 *
Arts & Sciences: Social Sciences	822.74	431.53	.0566
Two-Year Programs (b)	0		
Experience:			
9 of 10 Month Contract (b)	0		
11 or 12 Month Contract	10,966.60	383.22	.0000 *
Other Contract Length	-409.31	1151.91	.7224
Initial Rank: Instructor/Lecturer (b)	0		
Initial Rank: Assistant Professor	33.78	239.45	.8878
Initial Rank: Associate Professor	2,270.47	305.97	.0000 *
Initial Rank: Professor	7,956.77	379.89	.0000 *
Initial Rank: Leading Professor	10,468.86	1489.74	.0000 *
Rank: Instructor/Lecturer (b)	0		
Rank: Assistant Professor	3,856.67	389.05	.0000 *
Rank: Associate Professor	8,931.51	404.90	.0000 *
Rank: Professor	16,582.69	451.60	.0000 *
Rank: Leading Professor	33,055.38	1037.70	.0000 *
Years in Current Rank	69.07	15.51	.0000 *
Department Chairperson	3,401.12	309.39	.0000 *
Other Administrative Title(s)	3,989.62	360.03	.0000 *
Previous Administrative Title(s)	2,798.56	252.55	.0000 *
Total Years of Experience	99.80	13.92	.0000 *
ORGANIZATIONAL FACTORS			
Organizational Wealth Factor	2,086.01	145.07	.0000 *
Organizational Size Factor	1,636.38	74.07	.0000 *
Organizational Complexity Factor	1,688.14	78.42	.0000 *
Interaction Terms			
Organizational Wealth x Sex	-1,438.74	241.05	.0000 *
Organizational Size x Sex	-740.55	140.95	.0000 *
Organizational Complexity x Sex	-531.01	166.67	.0014 *
(CONSTANT)	22,717.13	562.07	.0000 *

a Variables dropped from the analysis include age and race/ethnicity.

b Reference category. The dollar amount associated with a given variable is in comparison to this group.

* = Statistical significance

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TABLE 4
Estimates of the Organizational and Individual Sources of Sex-Based Salary Differences by NCES Category
Gender-Based Salary Differences From:

NCES Institutional Types	Org. Wealth	Org. Size	Org. Complexity	Total Organizational Characteristics	Partial Effects	Individual and Organizational Sources for Female Faculty
Medical School	$-4,441.59	$ 438.98	$ 0.70	$-4,001.90	$-650.37	$-4,652.28
Doctoral & Medical	-472.31	-1,861.62	-48.54	-2,382.47	-650.37	-3,032.84
Doctoral	114.05	-421.30	-1,048.97	-1,356.22	-650.37	-2,006.59
Comprehensive	636.87	59.59	322.60	1,019.06	-650.37	368.69
Baccalaureate	432.49	621.05	-152.31	901.24	-650.37	250.87
Two-Year	788.51	366.07	-116.36	1,038.22	-650.37	387.85

Conclusions and Implications

The results of this study suggest that the salaries of female faculty at the smaller, less wealthy and less complex organizations are within a few hundred dollars of what might be predicted from their individual levels of education, rank, and academic discipline. In fact, the historic salary disparity between male and female faculty at many two-year and four-year institutions appears to have largely corrected itself in favor of women. On the other hand, larger, wealthier and more complex doctoral organizations not only pay higher salaries but continue to have greater salary disparities between male and female faculty.

The results of this research are consistent with the wage attainment and salary equity research suggesting that salary allocation decisions may be different for males and females in larger, more affluent institutions (Cohn 1971; Astin and Bayer 1972; Cox and Astin 1977; Stolzenberg 1978; Baron and Bielby 1984; Hodson 1984; and Tolbert 1986). While larger and wealthier institutions pay both males and females higher salaries, males appear to benefit considerably more from working in these organizations than do females. In addition, this research finds the same effects for the measure of organizational complexity; that is, the complexity of an institution increases the salaries of all faculty but males benefit more than females from employment at these institutions.

Without controlling for relevant individual and professional characteristics, Tolbert (1986) found unequal distribution of male/female salary differences across academic markets, and concluded that employer preferences may be easier to sustain in organizations that are better able to dominate their environments and that preferences may be not as easily sustained in less dominant organizations. The current study produced a similar result after controlling for an array of individual characteristics, and thus gives increased support to Tolbert's 1986 conclusions.

The demographic, education, work experience and organizational variables in our salary model explain 84 percent of the annual salary differences (FY87), providing a comprehensive basis for comparing faculty salaries. After controlling for the faculty credentials in the model, this study finds that comparable men and women are differentially compensated for being employed by the more dominant doctoral granting institutions.

This study utilizes a more narrow range of institutions than some of the earlier organizational studies. For example, Cohn (1971) and Tolbert (1986) both used national samples of higher education organizations and Baron and Bielby (1984) and Hodson (1984) were concerned with economic segmentation across industries in California and Wisconsin, respectively. In these cases, greater variability in organizational size affected salary levels to a larger extent than in our analysis which finds stronger salary influences from organizational expenditures per student than from size. It is perhaps more important to observe that the organizational variables as a group exert a $5,411 influence on academic salaries. We believe these affects, however, are understated, not only due to the influence of organizational isomorphism, but also due to the HEGIS discipline classification. Some of the HEGIS categories, such as medicine and two-year college technologies, capture considerable variance associated with the organizational measures.

Our findings are consistent with those of Scott and Bereman (1992) regarding the enomous influence of the academic discipline on salary. Faculty in business, medical, and scientific fields receive substantially more salary than their counterparts. While there have been striking changes in the gender composition of the academic workforce since the 1970s, female faculty in greater numbers than males are still segregated into disciplines and institutions that pay less well (Ransom 1990). The unequal distribution of salaries among academic occupations suggests that higher education institutions have rather well developed, independent systems of reward and supports the notion of firm internal labor markets postulated by Doeringer and Piore (1971). An important extension of this research would be to examine credential distributions and dollar returns to specific credentials by gender and type of academic market. Such an analysis may suggest the operation of dual labor markets, one for males and another for females, especially within the doctoral university markets as distinct from the less dominant, four-year and two-year college markets.

Thus, the current study finds ample support for existing structural/functional approaches and explanations for male/female academic salary differences. Congruent with the study by Smart (1991), our findings also support a human capital perspective. The human capital approach has viewed differences in personal investment as the primary reason for females earning lower salaries than males. Career and family choices that influence personal investments in education, professional training, and career mobility produce legitimate salary differences between male and female faculty. Indeed, our study finds significant and large differences in average male/female salaries to be explained by females attaining less education, fewer years of experience, lower ranks and initial ranks, and fewer administrative responsibilities.

We find that the credentials of women faculty as a group disadvantage their annual salaries to a much greater extent than salary differences from potential inequities. On the other hand, our research substantiates earlier findings suggesting that when *university* women make the same career choices as comparable men, they still do not make as much money, controlling for the variables in the model (Astin and Bayer 1972; Katz 1973; Darland et al. 1973; Bayer and Astin 1975; Ferber and Green 1984; Barbezat 1987). Thus, male/female differences in human capital investments may be influenced by perceived differences in salary and promotional opportunities, as well as by personal preferences and interests.

The size and complexity of academic organizations are very closely related, and we found that two of our complexity measures (highest degree offered and number of department chairs) loaded more heavily on organizational size and wealth than on complexity. This left the current study with a single measure of complexity. If the effects of complexity are of special interest to future researchers, then alternative measures should be tried, such as diversity of mission, the number of programs offered by award level, and organizational complexity at higher hierarchial levels.

While this investigation was not able to obtain information on other salary relevant varaibles (such as differences in scholarly productivity and teaching effectiveness), we believe that academic rank and initial rank approximate the salary effects of these variables. Prior research suggests that rank is highly correlated with productivity, experience and education, thus, both salary and promotion are estimated by the same determinants (Astin and Bayer 1972; Katz 1973; Scott 1977; Ferber and Green 1982; and Smart 1991).

Earlier research identified other organizational determinants as important to male/female wage differentials, and future research should take these into account. These measures include: per capita income of the institution's state, type of control, student/faculty ratios, rank segregation, sex composition of the discipline, percentage of Ph.D's employed in each discipline, institutional mission, and student selectivity. An investigation of the assumptions underlying faculty career and life-cycle choices is another natural extension of this research. Since labor market and non-labor market choices of both males and females have been influenced by the economic and demographic changes during the last twenty years, subsequent analysis should examine the barriers and opportunities that encourage and discourage faculty from full participation in educational degree attainment, pre-employment training, and career advancement.

One of the difficult policy issues raised by this research suggests that academic women earning the largest current salaries may deserve the largest salary adjustments. A $659 across-the-board increase for all women may be justified by this general academic salary analysis, but such action would do little to correct inequity in the medical and doctoral universities, and it may create further inequity for males in the two-year and four-year colleges. Yet, it may be politically difficult to correct disparities of several thousands of dollars for the smaller number of academic females at the medical and doctoral institutions, while leaving the salaries for the majority of academic women unchanged.

Knowledge that organizational contexts influence salary decisions and that the higher rewards associated with the institution of employment are not equally distributed among male and female faculty extends our understanding of the effects of university salary practices. To avoid perpetuating the salary differences identified by this research, continued assessment of the context and consequences of our everyday salary decisions must occur at the institutional, state, and national levels.

Appendix A: HEGIS Discipline Categories Used in This Study

Business and Management includes:	Business and Management
Health Related Professions include:	Health Related Professions
	Nursing
	Dental
	Optometry
	Pharmacy
Arts & Sciences: Humanities include:	Fine and Applied Arts
	Foreign Languages
	Letters
Medicine includes:	Medicine
Professional Programs include:	Agriculture and Natural Resources
	Architecture and Environmental Design
	Education
	Home Economics
	Library Science
	Public Affairs and Services
	EOC Programs
Science and Mathematics include:	Biological Sciences
	Computer Information Sciences
	Engineering
	Mathematics
	Physical Sciences
Arts & Sciences: Social Sciences:	Area Studies
	Communications
	Psychology
	Social Sciences
	Interdisciplinary Studies
	Law
Two-year Programs include:	Business/Commerce Technology
	Data Processing Technology
	Health Sciences/Paramedical Tech.
	Mechanical/Engineering Technology
	Natural Science Technology
	Public Service Technology

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Influence of Background Variables on Students' Evaluations of Faculty

Stuart L. Rich
Director of Institutional Research
Georgetown University

In a "Point of View" column in *The Chronicle of Higher Education* (July 21, 1993), Peter Seldin wrote:

> One reason that student evaluations of teachers have become so popular is that they are easy to administer and to score. But they also are easy to abuse. If they are to shed meaningful light on teachers' performance, the ratings must be used in a way that reflects at least some of what we've learned about them from the research literature and from experience. . . . Despite the fact that hundreds of studies have determined that student ratings generally are both reliable (yielding similar results consistently) and valid (measuring what the instrument is supposed to measure), some faculty members and administrators argue that factors beyond professors' control bias the ratings.

The literature on students' evaluations of faculty yields conflicting evidence on the influence of background variables—course level, class size, discipline, grades, sex and rank of faculty, for example—on their ratings. Some studies report no relationship between class size and ratings; others suggest a modest relationship (Aleamoni). Studies that find a relationship between grades and ratings generally find low correlations (Gleason), although one study (Kendler) found a strong negative correlation (-.75) in a large calculus course. Ratings have been found to be slightly higher in the humanities than in the social and natural sciences (Centra). Age of the instructor has been found to have a small effect on the students' ratings, with older faculty receiving lower ratings (Cashin). Sex has been found to have a small effect, but the differences generally have neither statistical nor practical significance. Regular faculty tend to receive higher ratings than graduate teaching assistants or other less permanent faculty (Braskamp, *et. al.*). Faculty continue to question the validity of the rating instrument—especially if their ratings are not as good as their colleagues'. In Peter Seldin's words, "The monumental investment of self that teaching demands predisposes professors to be sensitive to criticism of their performance." Because there is such a variety of findings in the literature, practically any faculty member with a complaint about her/his ratings can find a study which can be used to explain why his/her ratings are low or why the colleague's ratings are inappropriately high. If such challenges arise in a particular institution, it behooves the institutional researcher to be prepared to resolve the issues for that institution and its particular set of circumstances, which may or may not conform to the research results that a faculty member has chosen to make his case. In this paper we will describe the methodology, problems, and results which were used at one institution to respond to faculty inquiries about the effects of these background variables on their ratings by students.

Our data base consisted of some 3,500 undergraduate courses taught during academic years 1990-91 and 1991-92. Because our primary interest was in undergraduate teaching, we eliminated courses open primarily to graduate students, although graduate students may enroll in some of the courses which we did include. We matched the course records with a faculty data base in order to obtain sex, rank, and age of the faculty member who taught each course. Because the faculty/course rating instruments are completed anonymously, it is not possible to match each student's grade or demographic characteristics with his/her evaluation responses. We therefore calculated an average grade for each course section for comparison with the average evaluation score for the course. The evaluation instrument used at Georgetown is basically "summative", although there is a special section of the form which invites students' written comments, which may be more useful to the faculty member for "formative" purposes. Student evaluations are used extensively, but not alone, for faculty personnel decisions at Georgetown.

Both students and faculty tend to focus on the "overall" question—"What is your overall evaluation of the instructor?" So our first step was to examine Pearson correlation coefficients of the "overall" question with each of the other questions. As indicated in *Table 1*, the overall question's correlations with the other questions range from approximately .20 to as high as .92. The correlations with those questions which deal with the instructor (QIII.1—QIII.4) are "strong", *i.e.*, from .70 to .92.

Table 1.

Correlation of QIII.5. (Overall) with:*

	II. Course						III. Instructor			
	QII.1	QII.2	QII.3	QII.4	QII.5	QII.6	QIII.1	QIII.2	QIII.3	QIII.4
Business Admin	0.8892	0.7611	0.7844	0.7806	0.4650	0.8822	0.8870	0.9208	0.8701	0.9168
Humanities	0.7728	0.6246	0.5237	0.4180	0.2311	0.7762	0.7684	0.8882	0.6978	0.8813
Math/Science	0.7121	0.5561	0.3734	0.2726	0.2865	0.7460	0.4515	0.6283	0.7936	0.8867
Social Sciences	0.8276	0.6098	0.3976	0.2571	0.1938	0.8344	0.7944	0.8526	0.6837	0.8959
TOTAL	0.7921	0.6249	0.4929	0.3779	0.2258	0.7954	0.7328	0.8478	0.7250	0.8900

Note: All correlations are significant at the .01 level.

***II. Course Items**

1. To what degree were the stated objectives of the course met?
2. How effective were the readings, research, and other requirements in helping you to meet these objectives?
3. Did the exams or other graded material fairly represent the content and skills taught in the course?
4. Do you believe that exams and other work were graded fairly?
5. To what degree do specialized forms of study (labs, language drills, field trips, e.g.) contribute to the value of the course?
6. How much have you learned in the course? (Your assessment of the quality and extent of that learning)

***III. Instructor Items**

1. Does the instructor seem consistently well prepared for class?
2. Is the quality of classroom presentation stimulating (consider effectiveness of discussions, demonstrations and lectures)?
3. How available, willing and helpful is the instructor in advising and assisting students outside of class?
4. Does the instructor establish high standards, challenge you, and encourage you to do your best work?
5. What is your overall evaluation of the instructor?

Based on the strength of the relationships of the "Instructor" questions with the overall question, it was decided to use the overall question alone as the dependent variable in the analysis which follows. While the rating scale for all questions on the evaluation instrument ranges from 1 to 5, actual evaluation scores range from about 3.5 to 5.00; a rating of 1.56 was the lowest received in any course during this period and the 5th percentile was about 3.30. The distribution of responses is displayed in *Table 2*. One of the few background variables about which the research literature seems to be consistent is the "discipline". We grouped the departments into the four disciplines shown in the tables, because our departments vary greatly in size—from as small as three members to over 30. The distributions shown in *Table 2* show the discrepancy between the humanities and social and natural sciences which we would expect.

Table 2.

Distribution of Faculty Evaluation Scores (QIII.5.)

	No. of					Percentiles						
	Courses	**Min**	**5th**	**10th**	**25th**	**50th**	**75th**	**90th**	**95th**	**Max**	**Mean**	**Std Dev**
Business Admin	290	1.93	3.16	3.48	3.98	4.33	4.62	4.83	4.91	5.00	4.2103	0.5737
Humanities	1,856	2.00	3.38	3.67	4.11	4.50	4.75	4.91	5.00	5.00	4.3720	0.5059
Math/Science	322	1.56	3.22	3.47	3.94	4.31	4.63	4.80	5.00	5.00	4.2139	0.5697
Social Sciences	1,036	2.00	3.30	3.56	4.00	4.38	4.63	4.83	4.93	5.00	4.2690	0.5026
TOTAL	3,504	1.56	3.30	3.61	4.03	4.41	4.69	4.88	5.00	5.00	4.3136	0.5208

Using the SAS regression procedure, we examined the effect of course level, course size, average grade, faculty status (regular/adjunct), sex, age, and discipline on the average overall evaluation score received in each of the 3,500 courses. The results of two different approaches (five regression models) are contained in *Table 3*. In the first approach we entered discipline as a dummy (1/0) variable; in the second approach, we examined the effect of the explanatory variables within each discipline separately. The "R-square" statistic may be thought of as the proportion of variation in the dependent variable which the model explains. The R-square for Model 1 is .0896, *i.e.*, it explains about nine percent of the variation in the average faculty evaluation score. This is reassuring, since the evaluations should truly reflect the faculty member's performance and not the background variables which we set out to examine. The R-squares for the Humanities and the Social Sciences are similarly less than .10, although those for Business and Math/Science (the smallest of the groups) are about .20. It is typical that the R-square for a smaller group would be larger, since there will be less variance among fewer observations.

We will examine each of the explanatory variables in turn to determine which of them account for the explanatory power of the models. The regression coefficients in *Table 3* identify the effect of the explanatory variable when all other variables are accounted for. For the variables which designate "classes" or "categories" (course level, class size, sex, and faculty status), we designated membership in one of the classes by creation of "dummy" variables. In the case of "course level", for instance, courses at the 200-349 level are given a value of "1" and all others a value of "0". A second dummy variable similarly designates courses at the 350-499 level. Courses at the 001-199 level thus become the "omitted" class, to which the other two classes are compared. The 001-199 level therefore has a regression coefficient of 0.0000, because it has been "omitted". The 200-349 dummy measures the characteristics of this level which distinguish it from the 001-199 level. The 350-499 dummy measures the difference between evaluations at this level from those at the 001-199 level.

Course Level. We first examined course level as a continuous variable comprised of course number and the square of course number in order to determine if there is a curvilinear relationship between course number and the evaluation scores. Neither course number nor its square proved to be statistically significant in that model, so we categorized course level into three groups. Courses numbered 001-199 are primarily introductory and lower division courses, those numbered 200-349 are primarily upper division courses, and those numbered 350-499 are mixed upper division and graduate. We had assumed that course level would be collinear with student motivation as measured by choice of major and progression into upper division courses in the major, so it came as somewhat of a surprise that in two instances the courses numbered 200-349 had a negative effect on the evaluation scores. In Business that negative effect is substantial and significant. The "partial R—square" shows the proportion of the total variation in ratings that individual variables explain. In Business, course level's partial R—square is .0316, or about three percent of the variation. In the Social Sciences, courses numbered 200-349 have a significant positive effect on evaluation scores. The large positive effect in Math/Science probably reflects the collinearity of course level with major, since the introductory courses which are rated substantially lower are taken by non-science majors who have a requirement to fulfill.

Course Size. Runs of the models which included course size (and its square) as a continuous variable did not find it to be a significant predictor of the evaluation scores. As a categorical (dummy) variable, class size showed a significant negative effect for courses which were "medium" sized (21-50). The effect of "large" course size was mixed—overall and in the Social Sciences large classes have a positive but not significant effect on ratings. This may be due to the predominant use of "star" faculty in the largest lecture classes. Overall, the effect of class size tends to confirm the "given wisdom" that smaller classes are better than large classes. It should be noted that in no case does class size account for more than one percent of the variation in the ratings.

Average Grade. Grades had a significant positive effect on the ratings in each of the models we ran. Their effect ranged from a low of three percent in the Social Sciences to a high ten percent in Math/Science. From earlier studies, we know that grades awarded in the Humanities are significantly higher than those awarded in the other disciplines, but since grades in the Social Sciences are typically higher than those in Business Administration, it was a surprise to see that the effect of grades in Business was actually a bit larger than in the Social Sciences. It should be noted that students evaluate faculty and courses prior to final examinations when they do not know with any certainty what their final grade will be. The partial R—square shows that grades generally account for about half of the total R—square.

Full-time Faculty. With only one exception, full-time faculty receive significantly and substantially higher ratings than adjunct faculty. Even though the coefficient is not significant, it is interesting to note that adjunct faculty in Math/Science received higher ratings than full-time faculty. The largest effect is in Business, where full-time status explains about 2.5 percent of the variation in ratings.

Sex. Women received significantly and substantially lower ratings than men in Business, accounting for about three percent of the total variation within the discipline. In the Humanities and Social Sciences, their ratings were higher, but by an insubstantial and insignificant amount. In Math/Science women's ratings were lower than men's, although their small numbers account for the fact that the difference is not statistically significant.

Age. In examining age, we used a variation on the methodology used by Kinney and Smith (1989), who hypothesize that age and teaching effectiveness may have a linear/cumulative relationship that can be accounted for by age, followed by a decline which can be detected by squaring age. Our analysis showed age to have a curvilinear relationship with students' evaluations, generally positive in the early years, followed by slow growth or a plateau in the middle years and a rather sharp decline in the later years. These relationships are displayed graphically in the plots in the appendix to this paper. In those plots we have accounted only for the faculty member's age and for course level and class size. It should be noted that the net effect of age is rather small. Age accounts for about seven percent of the variation in ratings in Business and about four percent in Math/Science. One cannot help wondering if it is possible to determine whether the relationships between students' evaluations and age is truly due to declining effectiveness or is attributable to "distance" perceived between the students and their teachers. In the early years of a faculty member's career, he/she may be relatively close in age to the students; at mid-career he/she will be closer to the students' parents' ages; and in late career more like the students' grandparents.

Discipline. The "all discipline" model, which treated the four disciplines as dummy variables, found a substantial positive difference between the Humanities and Business and a smaller significant difference between Math/Science and Business, although both accounted for less than one percent of the total variation. The difference in ratings for the Social Sciences was neither practically nor statistically significant.

In a stepwise regression for all disciplines, seven of the twelve variables we considered met the .15 significance level for entry into the model. They are listed below in the order of their entry and their contribution to the R-square of the model. The total R-square for the stepwise model was .0889, whereas the R-square of the twelve-variable model was .0896.

Variable Entered	**Partial R-square**	**Model R-Square**
Grade	0.0549	0.0549
Age^2	0.0157	0.0706
Humanities Discipline	0.0068	0.0773
Faculty Full-time	0.0074	0.0847
Class Size 21-50	0.0020	0.0867
Course Level 350-499	0.0014	0.0881
Math/Science Disc.	0.0008	0.0889

The model accounts for only about nine percent of the variation in students' ratings of faculty. Over half of that is accounted for by grades alone. When the disciplines are treated separately (Models 2—5), the most variation that these variables account for is twenty percent. These results are within the range of variation found in other research reported in the literature. While the overall effect of these background variables is small, their influence on the evaluations within disciplines varies. The size of the effects in some circumstances is large enough to warrant consideration when assessing the ratings of individual courses/faculty who possess the characteristics investigated here. Where students' ratings are used in evaluating faculty's teaching performance, it is essential to understand whether factors which are beyond the professor's control bias the ratings. The process we have used here is relatively easy for the institutional researcher to implement in order to be prepared to answer inquiries from faculty, department chairs, and deans who may wish to know to what extent the ratings reflect extraneous characteristics of the classes which have been evaluated.

Table 3.

Influence of Background Variables on Students' Evaluations of Faculty Results of Five Regression Models

	1—All Disciplines		2—Business		3—Humanities		4—Math/Science		5—Social Sciences	
	Standardized Coefficients	Partial R-Square	Standardized Coefficients	Partial R-square	Standardized Coefficients	Partial R-square	Standardized Coefficients	Partial R-square	Standardized Coefficients	Partial R-square
Course Level: 001-199	0.0000		0.0000		0.0000		0.0000		0.0000	
200-349	-0.0087		-0.2171	0.0316	-0.0858	0.0068	0.1917	0.0153	0.1582	0.0152
350-499	0.0393	0.0014	0.0196		0.0426	0.0012	0.1796	0.0271	0.0753	0.0032
Course Size: 1-20	0.0000		0.0000		0.0000		0.0000		0.0000	
21-50	-0.0327	0.0020	-0.1166	0.0116	0.0142		-0.0594		-0.0895	0.0068
>50	0.0110		-0.0125		-0.0318	0.0012	-0.0096		0.0162	
Average Grade	0.2330	0.0549	0.2345	0.0383	0.2472	0.0586	0.1967	0.0979	0.1615	0.0341
Faculty: Full-time	0.0876	0.0074	0.2211	0.0246	0.0877	0.0081	-0.0362		0.0887	0.0056
Female	0.0012		-0.2106	0.0320	0.0324		-0.0581		0.0268	
Age	0.1377		0.9947	0.0184	0.1877		0.2393		0.0043	
Age^2	-0.2711	0.0157	-1.3030	0.0528	-0.2990	0.0102	-0.4511	0.0395	-0.0997	0.0079
Discipline: Business	0.0000									
Humanities	0.1235	0.0068								
Math/Science	0.0394	0.0008								
Social Sciences	0.0143									
Total R-square		0.0896		0.2098		0.0878		0.1860		0.0736
No. of Courses	3504		290		1856		322		1036	
Mean Evaluation	4.3136		4.2103		4.3720		4.2139		4.2690	

Note: Coefficients with a partial R-square statistic are significant at the .15 level or better.

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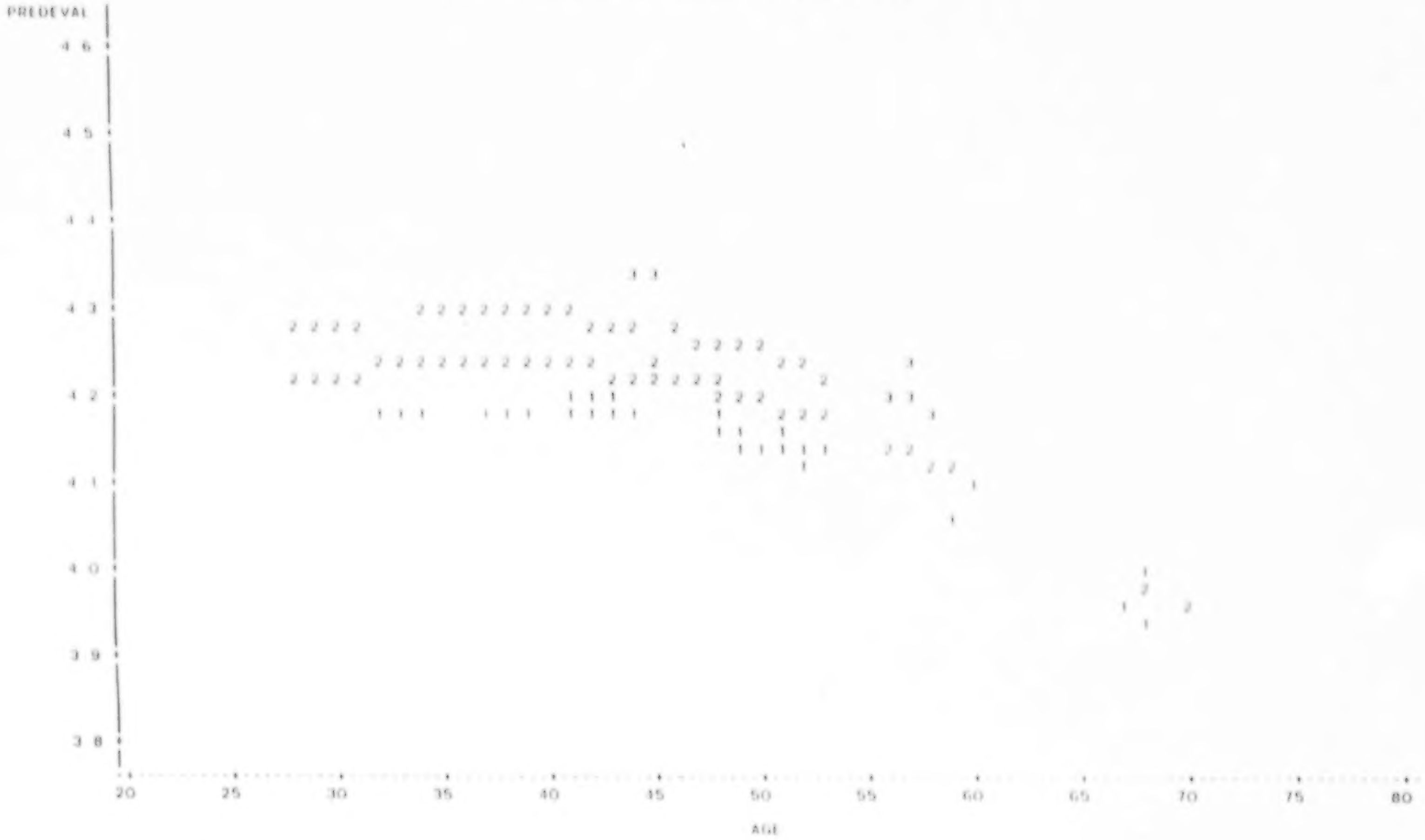
Faculty Evaluation Scores
Undergraduate Courses Evaluated 1990-91 and 1991-92
Regression Model Includes Discipline, Age, Age2, Course Level and Class Size

DISCIPLN=Business Admin

Plot of PREDEVAL*AGE. Symbol is value of LEVEL.



NOTE: 199 obs hidden

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                         Faculty Evaluation Scores
              Undergraduate Courses Evaluated 1990-91 and 1991-92
  Regression Model Includes Discipline, Age, Age2, Course Level and Class Size

------------------------------ DISCIPLN=Humanities ------------------------------

               Plot of PREDEVAL*AGE   Symbol is value of LEVEL
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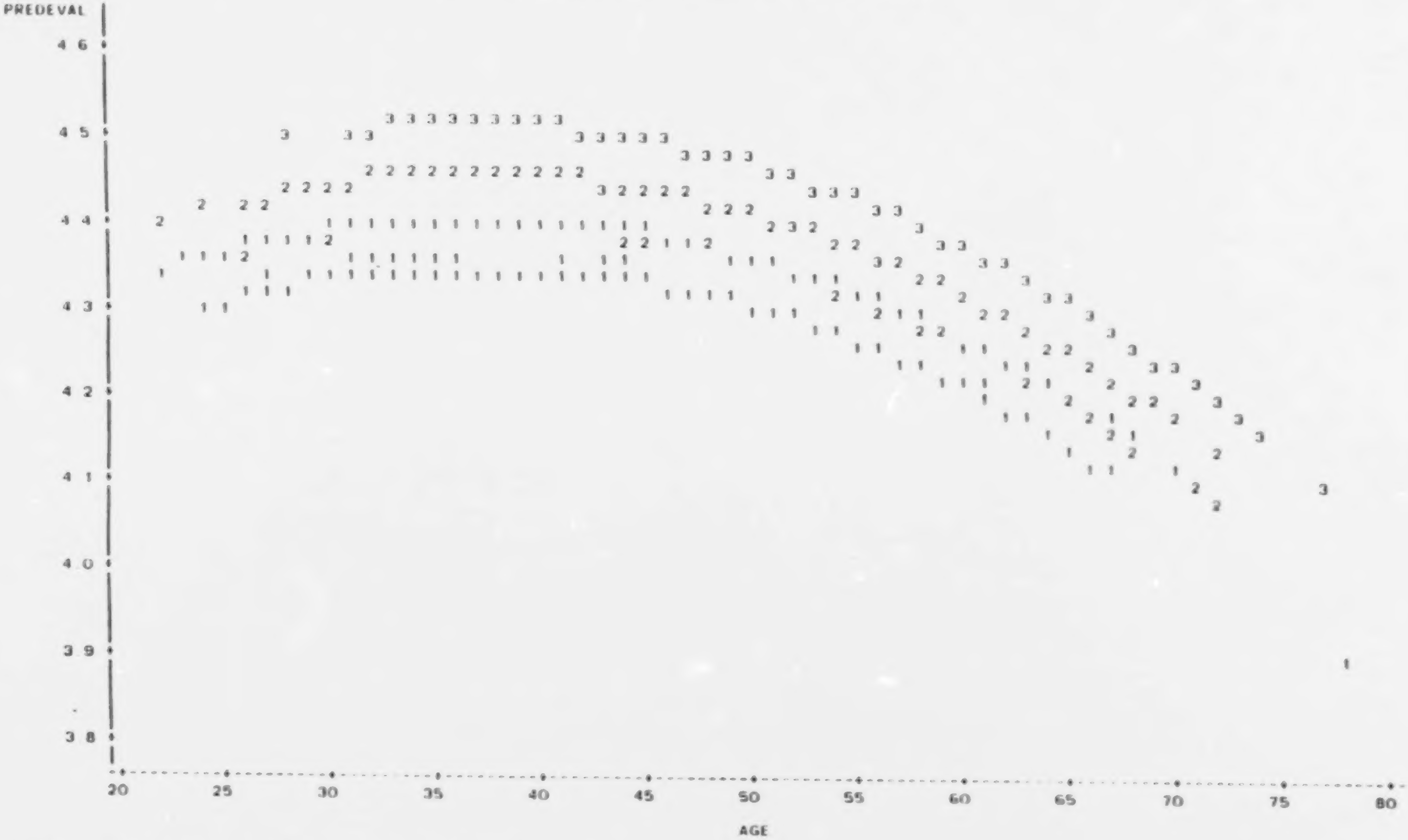

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NOTE: 4 obs had missing values   1676 obs hidden
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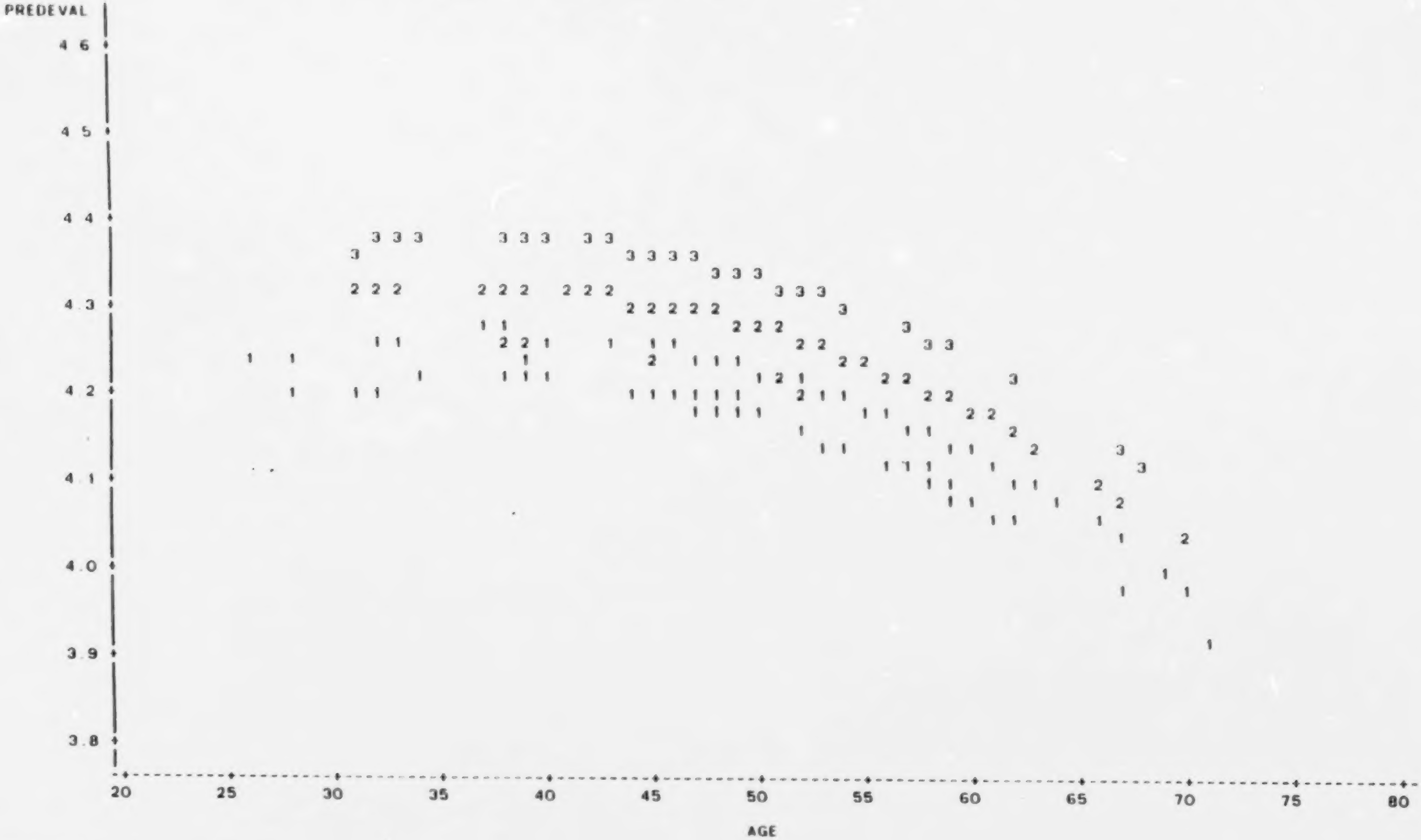
Faculty Evaluation Scores
Undergraduate Courses Evaluated 1990-91 and 1991-92
Regression Model Includes Discipline, Age, Age2, Course Level and Class Size

------------------------------ DISCIPLN=Math/Science ------------------------------

Plot of PREDEVAL*AGE   Symbol is value of LEVEL



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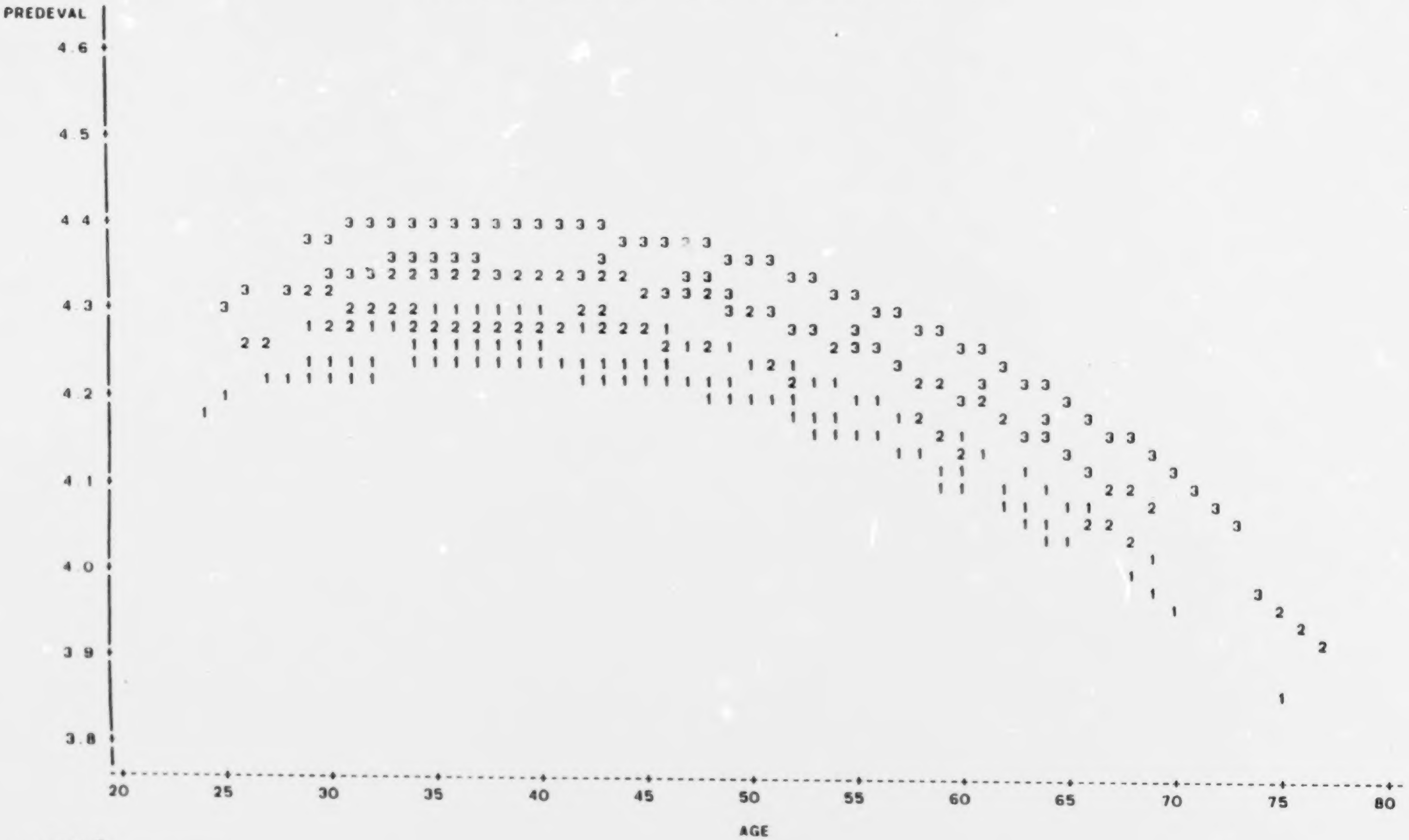
Faculty Evaluation Scores
Undergraduate Courses Evaluated 1990-91 and 1991-92
Regression Model Includes Discipline, Age, Age2, Course Level and Class Size

--- DISCIPLN=Social Sciences ---

Plot of PREDEVAL*AGE. Symbol is value of LEVEL.



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An Analysis of Patterns of Federal Support for Academic Science and Engineering: 1981-1991

James F. Trainer
Director
The Higher Education Data Sharing Consortium
Franklin and Marshall College

Introduction

This paper provides a longitudinal analysis of the availability of federal funds for academic science and engineering for the period 1981 through 1991. It examines the allocation of funds to institutions over time and explores shifts in the sources of funds vis-a-vis various federal agencies. Particular attention is paid to those agencies which appear to serve as potential "gateways" to federal funds for institutions that traditionally do not rank at or near the top of the list of total federal research dollars received. Funding data are adjusted against inflation through the use of the Research and Development Price Index (R&DPI), developed by the Research Associates of Washington. These adjustments allow for the measurement of any real change in research funding over time.

In addition to providing trend analyses of information on federally funded science and engineering, the paper serves as an example of the type of research that can be conducted employing the federally sponsored Computer Aided Science Policy Analysis and Research (CASPAR) database developed for the National Science Foundation (NSF) by the Quantum Research Corporation of Maryland. In this sense, the paper serves as an introduction to the use of federal databases for individuals not currently familiar with the availability and use of this type of information.

Background

Over the past fifty years, the federal government has played an increasingly important role in supporting academic science and engineering through the allocation of funds for the construction and maintenance of scientific facilities and the support of basic and applied research and development activities. While the history of federal support for agricultural research dates back nearly a half a century prior to 1940, the dawn of World War II ushered in the government's first true commitment to academic science. With grants in support of the war effort, the government began its role as a major funding agent of science and engineering. This support continued through the cold war and into the present era. Federal research funds have spawned discoveries in medicine, atomic energy, aeronautics, radar, and biotechnology, to name but a few areas. Indeed, the public, as represented by the government, has grown to accept its role in supporting academic research (Geiger, 1986 and 1993).

The allocation of federal funds has contributed to the development of an academic research economy. Institutions attempt to attract research funds for a variety of reasons. For instance, the availability of dollars to support research may be viewed by some institutions as a means to offset declining revenues in other areas. Some institutions may see research dollars as a way to decrease their tuition dependency. Other institutions may increase their research activity and, in turn, their research grant writing in an effort to move up in the oft-maligned, yet closely watched, academic prestige rankings, such as those produced by the National Research Council or those published by the *US News and World Report* and various other entities. Institutions also may see an increase in research activity as they hire younger faculty who have been socialized toward grant writing in graduate school and are eager to embark on their research careers. Thus, given the potential increased focus on research revenues, there were four objectives in doing this study:

Objectives

1. To analyze longitudinal patterns of federal support for academic science and engineering.

2. To identify agencies which may provide access to federal funds for institutions that traditionally are not among the top institutions in terms of total federal dollars received.

3. To examine the real availability of federal science and engineering funds relative to various measures of inflation.

4. To demonstrate the types of research that can be conducted using the CASPAR database and other publicly accessible information.

Sample

The analyses generally include data on 154 institutions, although some information is reported relative to total national research funding and fund recipients. The specific sample of 154 includes: The top 100 institutions in 1991 in terms of federal obligations for science and engineering, and 54 additional selected institutions. Data are sorted and analyzed for 14 different federal agencies and 8 academic disciplines.

Data Sources

1. NSF Survey of Federal Support to Universities, Colleges and Selected Non-Profit Institutions (filed annually by federal agencies). Data are employed in the study from the surveys from FY1981 through FY1991.*
2. NSF Survey of Scientific and Engineering Expenditures at Universities and Colleges (filed annually by academic institutions). Data are used in this study from the FY1991 survey.*
3. Inflation Measures for Schools and Colleges, published annually by Research Associates of Washington.

*These data were extracted from the Computer Aided Science Policy Analysis and Research Database System (CASPAR) developed by the Quantum Research Corporation of Bethesda, Maryland.

Procedures

Four basic steps were followed in completing this study. First, the appropriate data were extracted from the NSF Survey of Federal Support to Universities, Colleges and Selected Non-Profit Institutions on the CASPAR database for each one of the 154 institutions in the study's pool. The extracted data included the total dollars awarded by each of the 14 agencies nationally as well as the dollars awarded specifically to each of the 154 institutions in this study from the years 1981-1991. Data were also pulled from the NSF Survey of Scientific and Engineering Expenditures at Universities and Colleges to analyze the 1991 R&D expenditures at each of the 154 institutions by source of funds and by science and engineering disciplines. A count was also made of the total number of institutions that received funds from each of the 14 agencies in each year of the period studied.

Once the raw data were extracted from the database, all dollar amounts from previous years were converted into 1991 dollars. These adjustments were made by multiplying a given year's actual dollars by a factor which accounted for any inflationary growth between the year in question and 1991. The R&DPI was employed in making these adjustments, in that it best reflects changes in the costs of doing research. As an example, 1981 actual dollars were multiplied by a factor of 1.7 to convert them into 1991 constant dollars. Similarly, 1990 dollars were converted by a factor of 1.05.

Step three of the study involved measuring both the distribution of total available federal funds across agencies and institutions, and shifts in funding patterns over time. The effort focused on measuring any real growth and shifts in funding proportions between 1981 and 1991. Both percent distributions and percent changes were calculated.

The final step of the study centered around developing frequency counts of the number of years in which each institution received any funds from each of the studied agencies. These counts afforded a measure of any trend which may have developed regarding both the exclusivity of grant making by any agency and the dependency of any given institution on any one source or combination of federal funds. The analysis of these trends is helpful in identifying agencies which serve as "gateways" to federal funding.

Results

In Fiscal Year 1991 the 154 institutions examined in this study received 59% of their science and engineering research funds from the federal government. Institutional funds accounted for another 18% of their overall research revenues and expenditures. The remaining 24% of their research revenues were received in equal proportions from state and/or local governments, industry, and other sources (Figure 1).

These 154 institutions spent 50% of their research funds in the life sciences. Another 15% of their funds were expended in engineering, and 13% were spent in the physical sciences. Geosciences received 7% of available research funds and math/computer science and the social sciences each received 5%. The remaining 5% of the institutions' research budgets were split between psychology and other scientific disciplines (Figure 2).

Total federal funding for academic science and engineering activities grew 37.7% over and above inflation in the period from 1981 through 1991. The greatest percentage gains in available funds occurred in the Department of Education, the Department of Health and Human Services, and NASA, with growth rates of 261%, 197% and 90.1% respectively. Only the Nuclear Regulatory Commission (-57.3%), other agencies (-52.9%), and the Department of Transportation (-7.6) lost ground against inflation in terms of the research funds they awarded at the beginning and end of this period.

Figure 1
R & D Mean Expenditures by Source, 1991
Selected Universites

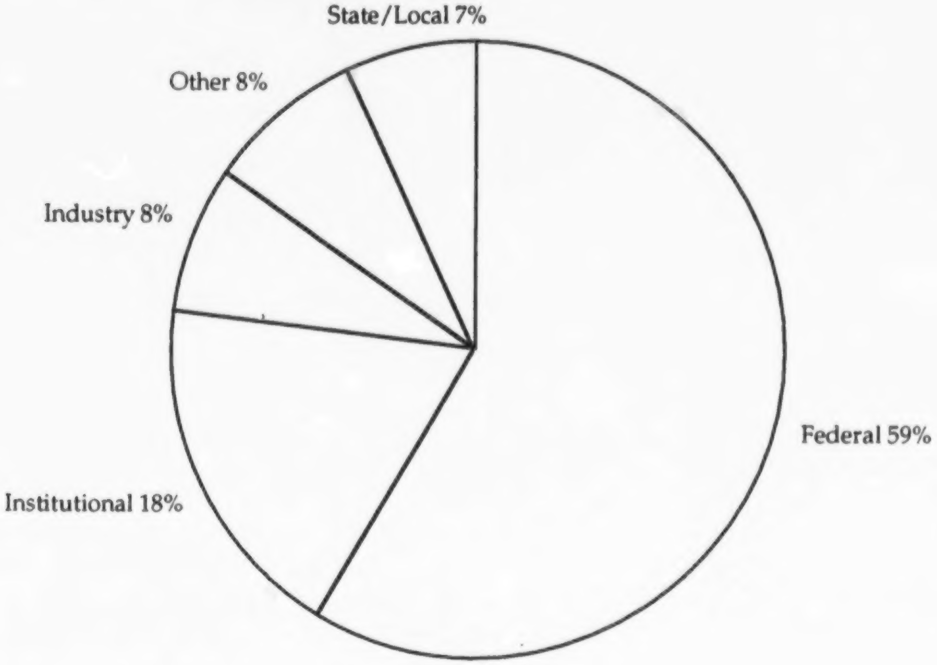


Figure 2
R & D Mean Expenditures by Field, 1991
Selected Universities

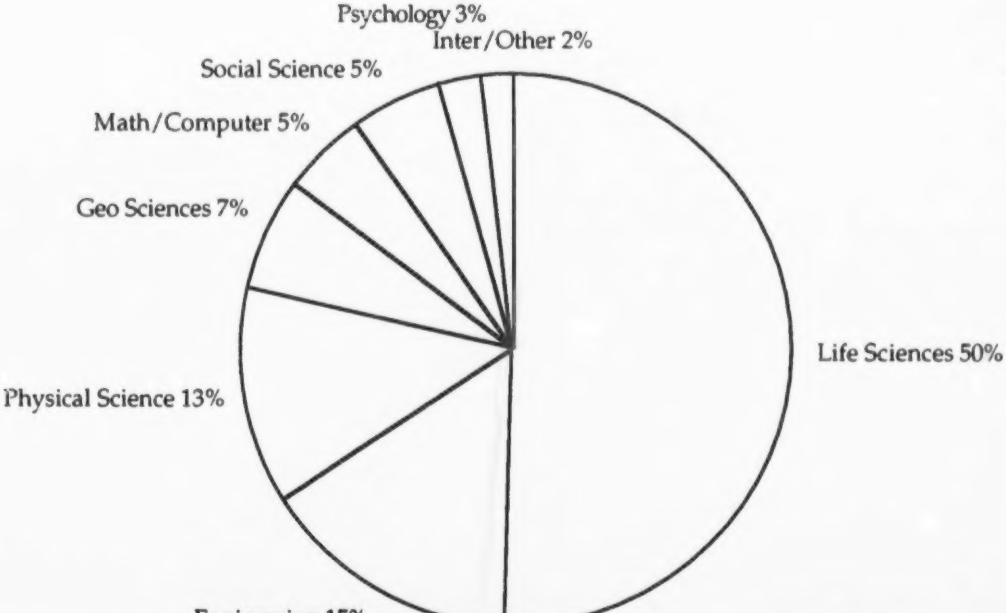


Table 1

Federal Obligations for Science and Engineering in Constant 1991 Dollars

Federal Agency	1981 ($000)	1986 ($000)	1991 ($000)	1981-91 Δ
Agriculture	835,397	794,490	867,424	+ 3.8%
Commerce	88,070	89,948	121,910	+ 38.4
Defense	1,234,253	1,543,900	1,539,231	+ 24.7
Education	95,328	94,721	344,157	+261.0
Energy	527,660	538,287	658,905	+ 24.9
EPA	114,794	90,565	115,925	+ 1.0
Interior	58,184	52,301	80,390	+ 38.2
NASA	311,950	345,984	592,923	+ 90.1
NIH	3,666,885	4,190,948	4,968,252	+ 35.5
NSF	1,181,677	1,351,450	1,642,261	+ 39.0
NRC	12,575	4,826	5,366	- 57.3
Other HHS	351,252	335,080	795,148	+197.7
Transportation	48,521	17,356	44,838	- 7.6
Other	80,310	61,661	37,809	- 52.9
Total Federal	8,606,855	9,511,516	11,814,539	+ 37.3

As Table 1 shows, the vast majority of federal funds for academic science and engineering are available through a relatively few federal agencies. The Department of Defense, the National Institutes of Health, and the National Science Foundation alone combined to account for over two-thirds of the nearly 12 billion dollars worth of federal grants made in science and engineering in fiscal year 1991. These agencies accounted for approximately the same proportion of total grant dollars in 1981. These three agencies also lead the way in granting money to the highest number of institutions. In 1991, for instance, of the total of 1141 institutions that received federal grants in science and engineering, 735 received funds from the NSF, 432 received funds from NIH, and 321 were awarded funds from the Department of Defense. However, each of these agencies also contribute at least 25% of their funds to ten institutions. In fact, of the 321 institutions that received funds from the Defense Department, ten institutions combined to received 52.7% of all of the funds allocated by this agency. All three of these agencies, however, allocated a smaller proportion of their funds to the top ten institutions in 1991 than they did in 1981; demonstrating at least the appearance of a desire to distribute more dollars to a greater number of institutions.

Table 2

Number of Institutions Receiving Federal Grants for Science and Engineering and the Percent of Total Dollars Awarded to each Agency's Top Ten Recipients

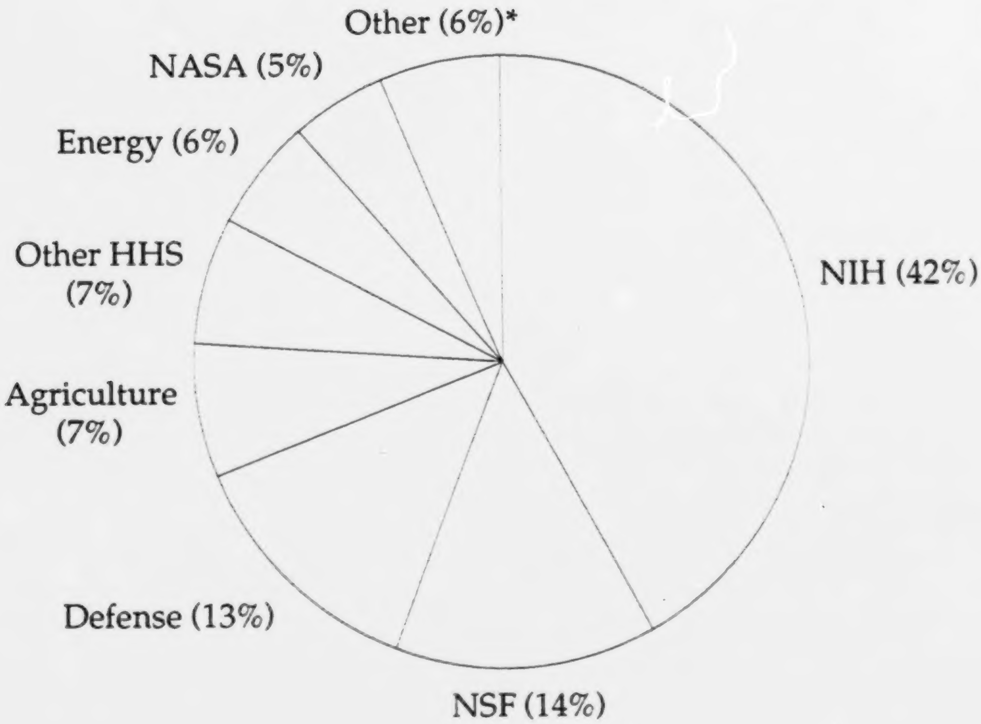
	1981			1991		
Agency	Sample N	National	Top 10	Sample N	National	Top 10
Agriculture	85	189	30.4%	88	232	28.3%
Commerce	67	116	39.8	73	121	39.5
Defense	122	274	61.3	132	321	52.7
Education	74	132	38.8	129	660	21.0
Energy	115	240	41.8	124	279	34.1
EPA	95	186	25.8	110	236	28.0
Interior	78	158	24.1	75	176	29.3
NASA	122	271	34.4	126	319	36.5
NIH	136	406	26.8	141	432	25.9
NSF	146	661	30.0	148	735	25.5
NRC	32	45	64.6	27	36	60.5
Other HHS	125	83*	31.6	129	51*	31.3
Transportation	72	116	57.4	39	86	39.9
Other	46	**	59.7	29	**	66.3
Total	152	899	24.6	154	1141	20.9

*The national numbers in this category include only those institutions that received funds from other HHS entities but not the NIH. The sample numbers include those institutions that received funds from other HHS entities as well as possibly the NIH.

**Count not available.

Although awarding less dollars than most other agencies, the Department of Education supplied funds to 660 institutions in 1991, second only to the NSF in the number of grants awarded. Unfortunately, however, grants from the Department of Education accounted for only 2.9% of the total federal research dollars allocated for science and engineering in 1991 (Figure 3). Unlike the more lucrative funding agencies, which also tend to grant a large proportion of their funds to relatively few institutions, the Department of Education awarded only 21% of its grant dollars to the top ten of its 660 recipient institutions. No other single agency awarded less than 25.5% of its research funds to the top ten institutions on its list as evidenced by the data reported in Table 2.

Figure 3
Distribution of Federal Funds by Agency in 1991



*Other category includes Commerce, Education, EPA, Interior, NRC, Transportation, and Other Federal Agencies.

The top ten institutions, in terms of total federal dollars received, were granted 20.9% of federal funds for science and engineering in 1991. In addition, the list of institutions at and near the top of the federal obligations list has remained relatively stable over time. These institutions also tend to receive funds from a variety of agencies. However, while institutions at the top of the list attract nearly all the funds from certain agencies, they tend to attract a smaller proportion of funds from other agencies. Thus, those agencies not awarding the majority of their funds to the top institutions, in terms of dollars received, may serve as "gateways" to federal funds for certain institutions. These agencies include the Department of Education and to lesser degrees the NIH and the NSF.

Conclusion

Over the last half century a symbiotic relationship has developed between the federal government and our nation's colleges and universities. The government, for its part, has contributed funds which have fostered the development of the academic research economy. Numerous institutions and thousands of research scientists have received funds supporting a variety of research enterprises and endeavors. In exchange for this support, academic scientists have made important discoveries in advancing medical science, our national defense, the space program, and many other areas crucial to our nation's security and well-being.

However, changes may be on the horizon in terms of federal support for academic science. As the nation wrestles with the federal deficit, one has to wonder whether the funding trends of the past will continue. For example, some may fear that the congressional cancellation of the super collider project may mark the beginning of the end for federally funded "big science." Likewise, some institutions may be negatively affected by down-sizing at the Department of Defense. Further, all institutions that receive federal research funds should be concerned about the potential fallout from the recent scandal related to inappropriate indirect cost/overhead charges, and the current public outcry over congress' non-competitive "scientific pork barrel" grant making. In short, institutions should be concerned that the public's interest in supporting academic research is waning. Indeed, if this is the case, we may need either to take steps to reaffirm the public's trust in academic research or to re-examine the academic research economy's dependency on federal funding; either option is bound to have a significant impact on the way we fund, conduct, and promote academic research.

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THE RELATIONSHIP OF CAMPUS CRIME TO CAMPUS AND COMMUNITY CHARACTERISTICS

J. Fredericks Volkwein
Director of Institutional Research
University at Albany

Bruce Szelest
Associate for Institutional Research
University at Albany

Alan J. Lizotte
Professor of Criminal Justice
University at Albany

Introduction

Campus crime, while receiving heightened media attention the past two to three years, is not yet well understood in the academic community. Very few investigative studies have been conducted on the correlates of campus crime. If the issue continues to receive heightened media coverage, the higher education community must be able to show that it understands the problem and is addressing it. Numerous civil court cases have also pointed out the need for campus administrators and executives to be cognizant of their duties and responsibilities with respect to protecting students from criminal activity (Richmond, 1990). This study examines the correlates of campus crime. Its focus is on the characteristics of campuses, of students, and of the communities that surround them that are associated with crime on campus.

Providing insights to campus crime should help students, faculty, and administrators alike to develop more effective responses and strategies to address crime on campus. Such information also should increase understanding among trustees, legislators, parents, and others concerned about the problem.

Residential campuses are unique institutions in American society because many have a relatively homogeneous population with respect to age, are comprised of a highly mobile population, and have a well defined sense of university community. Furthermore, colleges and universities pose an "environment that can be subjected to alteration and control" (Fox and Hellman, 1985). Additionally, universities have direct responsibility for, if not control over dormitories and other campus buildings. Even with the demise of *in loco parentis*, colleges and universities are generally responsible for student safety, especially on campus, and are widely believed to exert considerable influence on the personal activities of their students(Richmond, 1990).

The Student Right-to-Know and Campus Security Act of 1990, largely a result of a grass roots movement to make campus crime data available to current and prospective students, has further directed public attention toward campus criminal activities and safety. For the first time, in 1993, every college and university receiving federal funds is required to issue, upon request, an annual security report to employees, to students and their parents, as well as to the secretary of education. The report is to include a statement of security policies, and crime statistics for the preceding three years covering the crimes occurring on campus in the following categories: murder, rape, aggravated assault, burglary, motor vehicle theft, and alcohol and drug violations.

The Chronicle of Higher Education recently published college and university crime rates for nearly 2,400 institutions of higher education (Chronicle, Jan. 20, 1993). The Chronicle reported that there were 7,500 incidents of violent crime on U.S. campuses in 1992, including 30 murders, 1,000 rapes, 1,800 robberies. In addition, there were 32,127 burglaries and 8,981 motor vehicle thefts.

While many concerned individuals and organizations welcome the new law requiring the disclosure of campus crime data, many college officials see the disclosure as a potentially damaging act. They express a concern that people will use the crime data to "sensationalize or stereotype institutions" (Chronicle, July. 22, 1992). Indeed, the legislation does not provide a context for interpreting the data. It does not seek to distinguish between residential and commuting institutions. Institutions with very small enrollments may appear to have very low instances of crime vis-a-vis large institutions, but when enrollments are taken into account they may in fact have higher per capita crime rates. Colleges are weary that crime numbers will be used out of context. Most administrators believe that there is significantly less crime on campuses than in communities (Chronicle, Jan. 20, 1993), which, as we will discuss later, our study bears out.

The debate about publishing campus crime continues though. Many people familiar with the issue believe that colleges are merely concerned with their images, not about safety. To them the debate over crime reporting is about its impact on money generated by enrollments and alumni contributions (Chronicle, July. 22, 1992). Regardless of one's feelings about campus crime reporting it is the law, and campus crime is an issue of concern to all who attend and support colleges and universities. Moreover, there is a dearth of descriptive and analytical studies.

Theoretical Framework

Why are colleges and universities susceptible to crime? The conceptual framework for our study derives both from the field of criminal justice and from earlier research. Crime in society generally falls within the framework of **Routine Activities Theory.** According to Cohen and Felson, most criminal acts require convergence in space and time of likely offenders, suitable targets, and the absence of capable guardians. This theory is based on the "supposition that daily work activities separate many people from those they trust and from property they value" (Cohen and Felson, 1979). Routine activities bring together people of different backgrounds. Likely offenders are found within the surrounding community, if not within the student body itself. If a capable guardian is absent, then the probability of crime occurring becomes higher. Colleges and universities by their nature, contain suitable targets for offenders - people coming and going at all hours, unattended or poorly secured buildings, accessible motor vehicles, and items of high value per unit size, such as stereo equipment and desk-top computers. Given the dispersed nature of many campuses, guardians such as campus police or students are rarely standing watch over valuables. While offenders may be exogenous to the campus or students themselves, suitable targets and the absence of guardians lead to Cohen and Felson's convergence that explains the occurrence of campus crime.

Campus crime occurs, but what influences or contributes to its occurrence? Fox and Hellman (1985) conducted a study of factors that influence the total campus crime rate, as reported by the

FBI's Uniform Crime Reports. They examined such things as student characteristics, structural features of the campus, administrative staffing, and location. This study was published several years prior to the recent explosion of media attention on campus crime and used data from 1980. The authors' found colleges and universities have less crime than their surrounding communities and location had little or no influence on the ratio of campus to community crime. Among the correlations between campus crime and university characteristics found by Fox and Hellman were:

- Positive, significant correlations between campus crime and tuition cost, the percent of male students, population density, and campus police staffing levels.
- The percent of minority students on campus was not a significant correlate of campus crime.

Within the framework of Routine Activities Theory, and using a larger more elaborate database, we sought to revisit the earlier 1980 research, especially in view of recent media attention and expressed concern by students and parents.

Methodology

Using both longitudinal and cross-sectional databases, and both descriptive and multivariate analyses, this study examines the trends and correlates of campus crime. The two primary aspects of the study examine the trends in campus crime since 1974, and analyze 1990 cross sectional data for relationships between campus crime and college characteristics. Fox and Hellman's study utilized 1980 crime statistics and campus data for 222 colleges and universities. This current study utilizes a similar but expanded dataset of 400 institutions of higher education using several sources of data.

The Consortium for Higher Education Campus Crime Research (CHECCR) has amassed data on a sample of 400 college campuses across the country. These data are being compiled by CHECCR to better inform institutions of higher education about the causes and correlates of crime on campus. Two kinds of CHECCR analyses can be presented to participating institutions. The first is a general report about the causes and correlates of campus crime in general. These analyses can be broken down by type of crime and characteristics of the institution. The second type is an individual, confidential, proprietary report considering how a particular campus ranks relative to others of similar size and type.

Our research draws upon three merged national databases of federal crime statistics, community demographic data, and campus characteristics data, the latter from the College Board Survey.

Database Building

Two data sets have been constructed using the Federal Bureau of Investigation's (FBI) Uniform Crime Report (UCR) data on campus crime. The first is a time series data set that plots trends in specific types of crime from 1974 to 1991 for colleges that have reported consistently. Because the number of colleges reporting instances of crime to the FBI has increased each year, another version of this time series uses data on all colleges reporting each year. This data set allows us to view trends in specific types of crime over time.

The second FBI data set is a cross section of the 400 colleges reporting to the UCR in 1990. Variables in the data set include crime rates for specific types of crime, along with characteristics of the campus and the community in which the campus is housed.

These data sets allow us to examine many questions about the character and correlates of specific types of campus crime. For example, what are the trends in campus crime since 1974? How do community characteristics affect crime rates on campus?

While many campus and student body characteristics are included in the 1990 UCR data set, these data items were improved and expanded upon by merging it with data from the 1989-90 College Board Survey. In addition, we utilized information from the Carnegie Commission, Barron's Guide, U.S. News and World Report, the College Board, and the Chronicle of Higher Education. By compiling the additional data items we were able to expand the focus of the inquiry to examine a full range of college and student characteristics in addition to the community characteristics contained in the FBI data.

Variable Reduction

Merging the 1990 CHECCR crime data and the 1989 college and student characteristics database supplied over 475 separate variables as potential correlates of campus crime. Many variables provided redundant information, and several had an inordinate amount of missing data across many colleges in the sample. These variables were accordingly excluded from the examination. However, the broad scope and plethora of original data items provided more than enough information to proceed with the investigation.

Upon review, the remaining independent variables were worked into three broad categories: student, organizational, and community variables. The three groupings appear to fit well into Cohen and Felson's **Routine Activities Theory**. Students or their property comprise accessible targets, the organizational characteristics act as a surrogate for capable guardians, and community characteristics may provide likely offenders. It should be noted that there is not a clear delineation between each of the categories. For instance, some organizational characteristics such as the percent of students in residence halls could also be thought of as a student characteristic.

The framework of dividing the variables into three groups also served to aid in additional variable reduction. Variables that violated ordinary least squares error assumptions and caused considerable multi-colinearity were able to be replaced with variables that explained similar degrees of the data variance but did not violate such assumptions.

The refined dataset of predictors was whittled down to 68 variables - twenty-four surrogates of student characteristics, twenty-four surrogates of organizational characteristics, and twenty surrogates of community characteristics. Separate factor analyses (principle components analyses) were conducted for each grouping, aiding in the adoption of 20 variables for the final regression equations. The factor analyses grouped together those variables that explain similar aspects of the variance in campus crime. Variables were selected on the basis of having high factor loadings, a large number of cases, and lacking colinearity.

Table 1 lists the community variables utilized in the initial model and the number of cases containing the information. The variables in bold print were used in the final model equations. Where applicable, the factor loadings associated with each variable and its corresponding factor are shown.

Table 1

Community Characteristics

N	**Variable**	**Crime**	**Population**	**Poverty**	**Climate**
380	**Property Crime Rate/100,000**	.87			
380	**Violent Crime Rate/100,000**	.86			
380	**Total Crime Rate/100,000**	.90			
388	**Urban - Not Urban**	.62			
380	Murder Rate/100,000	.81			
380	Motor Vehicle Theft Rate/100,000	.81			
380	Robbery Rate/100,000	.67			
380	Assault Rate/100,000	.82			
380	Rape Rate/100,000	.79			
380	Burglary Rate/100,000	.86			
380	Arson Rate/100,000	.58			
380	Police Force Rate/100,000	.74			
397	**Population**		.90		
394	Persons Age 18-20		.96		
394	Persons Age 21-24		.86		
394	Number of Female Headed Households		.79		
394	**Percent Below Poverty Level**			.81	
394	Percent Unemployed			.76	
394	Average Income			-.76	
397	**Average Temperature**				.76

The community characteristics, when subjected to principal components analysis, factored into four separate groupings: crime, population, poverty, and climate. We decided to use violent, property, and total crime. Also included in the crime factor was a variable for community urban - non urban setting. We selected community population and the percent of the community population below the poverty level as the best variables from those factors.

Finally, average temperature of the area was included in the regression. It has been shown in the criminal justice literature that temperature does indeed have a statistical correlation with crime rates. The warmer an area is the more likely people are outside doing things and leaving their valuables unattended - targets for theft. Additionally, interactions between disagreeing parties are more likely to turn confrontational in sweltering heat.

The organizational characteristics also were subjected to principal components analysis to identify those variables that tend to vary together. As shown in Table 2, these data separated along four basic lines: size, cost, resource base, and density.

Table 2

Organizational Characteristics

N	Variable	Size	Cost	Resource Base	Density
355	Number Faculty with Ph.D.	.91			
423	**Number FT Faculty**	.88			
355	Wealth (tricotimized)	.86			
346	Number Library Volumes	.82			
433	**Total Enrollment**	.77			
433	Total FT & PT Undergrads	.72			
390	Number VPs & Deans	.66			
361	**Percent Students in College Housing**	-.50			
144	Avg. Associate Professor Salary		.90		
144	Avg. Associate Professor Salary		.89		
144	Avg. Pull Professor Salary		.84		
388	Instate Tuition Charge		.82		
432	**Tuition cost**		.82		
354	**Room & Board Cost**		.80		
355	Percent FT Faculty w/ Ph.D.		.83		
145	R & D. Expenditures per Student		.53		
433	Public/Private				
346	**Library Holdings per Student**			.87	
104	Endowment per Student			.65	
383	**Campus Police Rate**			.63	
372	Student/Faculty Ratio			-.55	
378	**Number of Campus Acres**				.93
372	Campus Police per Acre				.86
371	**Students per Campus Acre**				.82

Based upon the number of cases and the factor loadings, we selected three size variables for the final model: the number of full-time faculty, total enrollment, and the percent of students in college housing. The relative size of the residence hall operation could serve as a student body characteristic as well as organizational characteristic.

While tuition cost and room and board cost are very similar, they both were used in the final model, especially since tuition is a proxy for public/private, while room and board cost relates to organizational and student affluence. Full, associate, and assistant professor salaries, while having the highest cost factor loadings were only available for 144 colleges, and were eliminated from consideration.

Library holdings per student and the campus police rate (per 100,000) were utilized from the resource base factor because they had more valid cases than endowment per student. The student faculty ratio caused colinearity problems in the final regressions and was excluded from the final analysis.

The number of campus acres and the number of students per campus acre were included in the final regression as density indicators. While campus police per acre was considered a possible indicator of guardian coverage, it did not fit as well as campus police per capita in subsequent regression equations.

Only six of the student characteristic variables made their way into the final model. Table 3 below shows them. While eight of the variables in the selectivity factor loaded highly, only the percent of freshmen in the top 10% of their high school class was included in the final model. The other variables in the selectivity factor, while loading high, nonetheless were eliminated due to problems with multicolinearity or missing data.

Table 3

Student Characteristics

N	Variable	electivity	Fraternity/ Sorority	Financial Aid	Ethnic	Demographic
275	**Percent from Top 10% of High School**	.85				
173	1990 Frosh Attrition	-.88				
271	Percent from Top 25% of High School	.815				
377	Percent Frosh Appl. Accepted	-.815				
336	Barron's Competitiveness	.81				
374	Difficulty of Entrance	.81				
173	1990 Frosh Retention Rate	.79				
171	1990 Graduation Rate	.72				
241	Percent Females Sorority		.93			
242	Percent Males in Fraternity		.92			
246	**Percent Fraternity/Sorority**		.90			
372	**Percent on Financial Aid**			.91		
372	Percent Freshmen w/ Fin Aid			.87		
341	**Percent Minority Students**				.85	
376	**Percent Undergrads - Male**					.57
424	**Percent in-State Students**					-.54
378	Percent Foreign Students					
415	Average Age of Undergraduates					
419	Percent Total Students Commuting					
252	Total Transfers Enrolled					
240	Percent Enrolled Frosh w/ Need					
433	Total FT Graduate Students					
305	Percent Accepted that Enroll					
372	Student/Faculty Ratio					

The percent of students in fraternities or sororities was utilized rather than just the percentage of males in fraternities or the percentage of females in sororities, even though all three had very high factor loadings.

The financial aid factor contained two indicators of student need: the percentage of freshmen with financial aid, and the percentage of all undergraduates with financial aid. The more encompassing indicator of total undergraduate student body need was utilized in this case.

CHART ONE

Violent Crime Rates Per 100,000
National and Campus Crime Rates

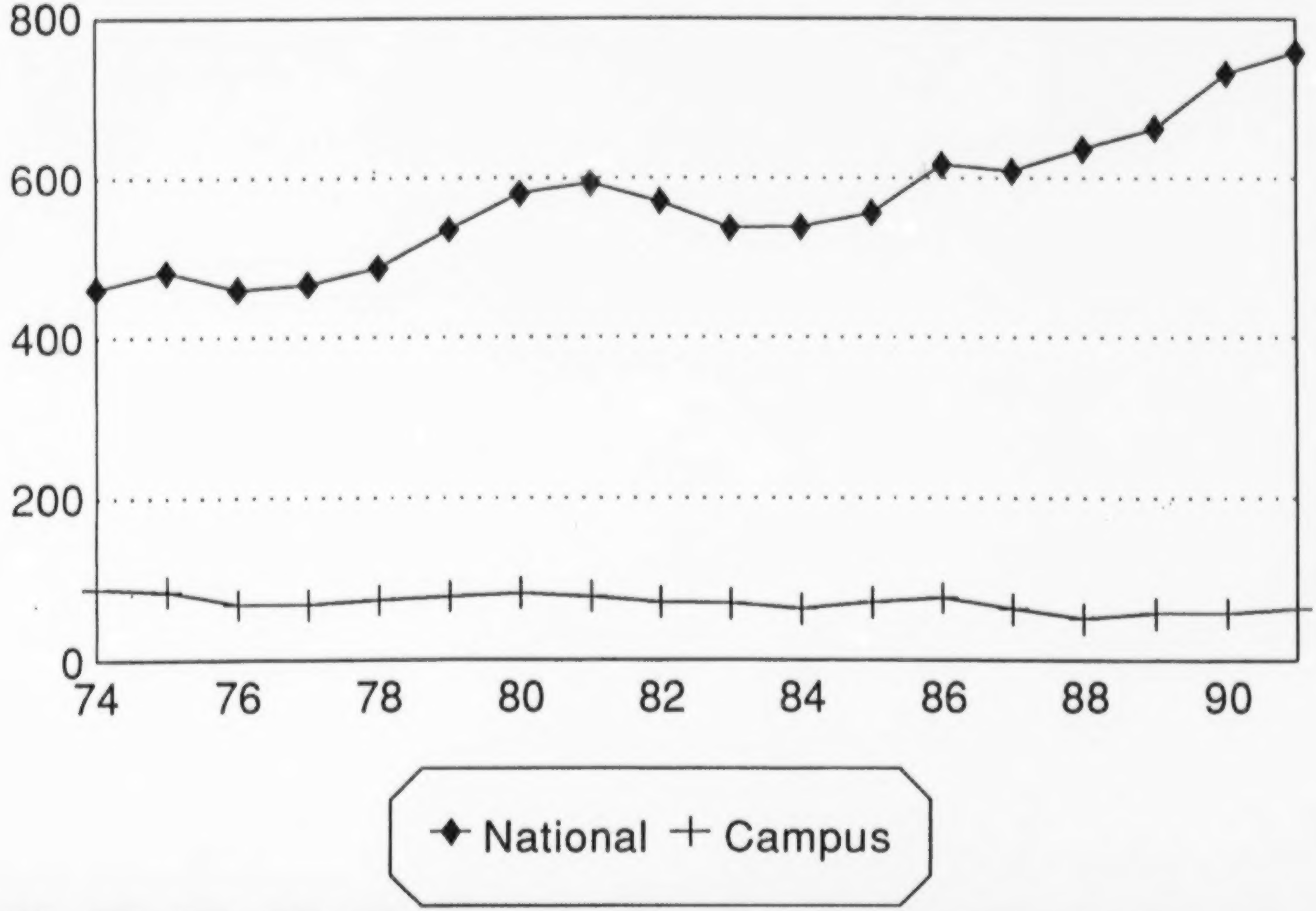
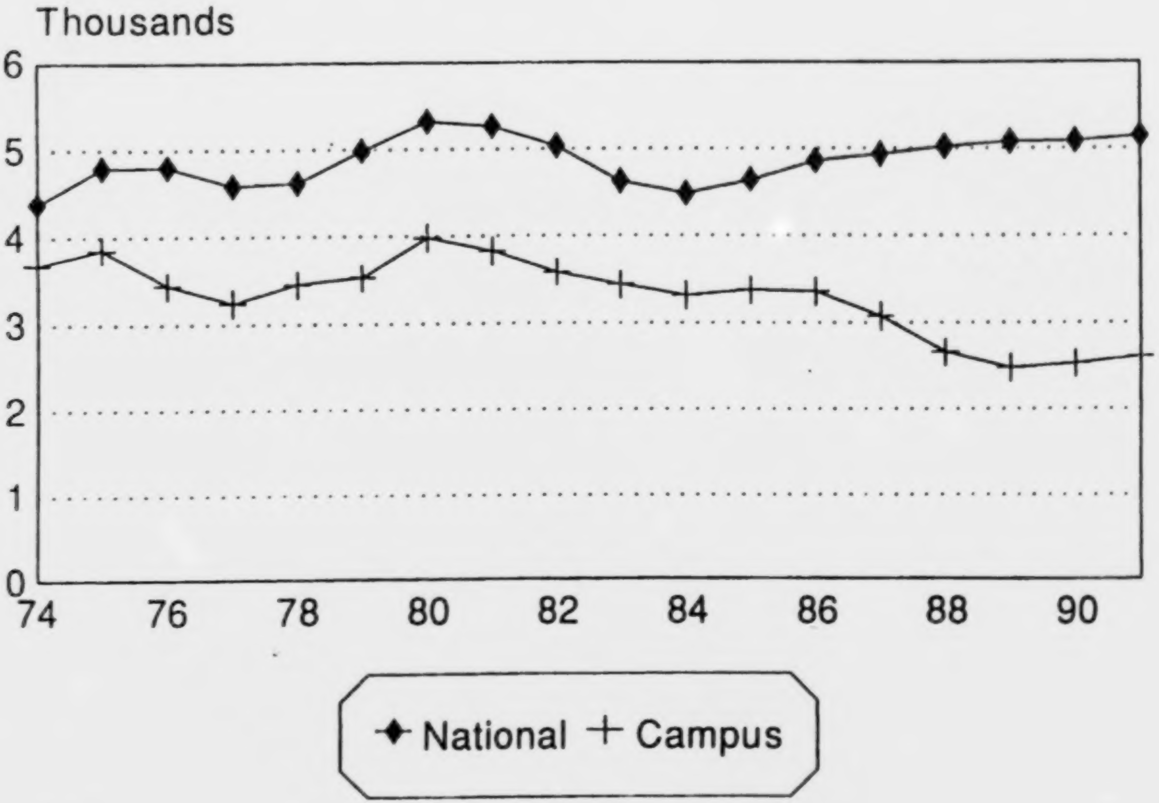


CHART TWO

Property Crime Rates Per 100,000 National and Campus Crime Rates



The percentage of minority students, the percent male, and the percentage of students from in-state each had isolated high loadings, and were kept in the final model to incorporate measures of student diversity.

RESULTS

Trends in Campus crime

As a first step, we examined the longitudinal data set for trends in specific types of crime over time. These crime data are reported **per 100,000 students**. The campus crime rates, therefore, would be even lower if the database included faculty, staff, and visitors in the population. For example, a single sports event on a Saturday night can attract tens of thousands of visitors to the campus, and several CHECCR institutions report that a significant amount of their campus crime is associated with such events.

Chart One compares **violent crime** on-campus to the national trends and shows that **campuses are over 10 times safer than the nation in general**. Violent crime includes murder, assault, rape, and robbery, with assault generally constituting over 75% of the incidents, and robbery another 15%. In 1991, for example, there were more than 750 violent crimes per 100,000 people in the nation, but only about 64 per 100,000 students on campus.

Chart One also reflects a **27% decrease since 1974 in violent crime on-campus** (from 88 to 64 per 100,000), while crime was increasing in the nation by 41% (from 460 to 758 per 100,000). The data for the individual crimes of homicide, assault, rape, and robbery are each relatively consistent with this overall trend -- rising for the nation as a whole, but falling on campus. As the country becomes more dangerous, campuses are becoming safer. These findings are particularly striking when one considers that campuses are full of young people, and these are the most likely to become involved in crime, whether as victims or as offenders.

Chart Two compares **property crime** on-campus to the national trends. Property crime includes larceny, burglary, and vehicle theft. Larceny is the largest component of the overall crime rate, and generally accounts for over 80% of campus crime and 55% of crime in the country. Campus property crime in general, and larceny in particular, exhibited similar trends until 1985 when the campus rate began to decrease as the national rate increased. Burglary and vehicle theft rates are substantially higher in the nation than they are on campuses, but burglary rates have been falling while campus vehicle thefts have remained essentially level. It seems logical to attribute the overall improvement in campus crime rates to local crime prevention efforts.

The Correlates of Campus Crime

What are the community, organizational, and student characteristics that are most strongly associated with campus crime? As noted above, we merged data from the 1990 FBI Uniform Crime Report with data from the 1989-90 College Board Survey, as well as data from other sources, in order to examine the relationships between crime rates and campus and student characteristics. Table 4 displays the rates of violent crime, property crime, and total crime by campus type.

Table 4
Campus Crime Rate (Per 100,000) By carnegie Type
(N=390)

		Type of Crime		
Carnegie Type	**N**	**Violent**	**Property**	**Total**
Two-year	61	36	1507	1543
Liberal-arts II	7	77	2513	2590
Comprehensive II	15	209	1778	1986
Comprehensive I	163	74	1935	2010
Doctoral II	25	70	2028	2098
Doctoral I	31	67	2662	2729
Research II	23	65	3109	3174
Research I	44	79	4075	4153
Medical and other	18	99	10744	10843

Note: **Violent crime** includes aggravated assault, armed robbery, forcible rape, and murder.
Property crime includes larceny, burglary, and vehicle theft.

The lowest violent and property crime rates are at two-year institutions -- campuses that are mostly non-residential. The highest rates, especially property crime, are at medical schools and health science centers -- institutions that are located generally in inner cities with expensive equipment and many affluent personnel. The highest rate of violent crime (208 per 100,000) is found at Comprehensive II campuses, mostly state colleges in relatively small college towns. The most selective Liberal Arts I schools (although there are only three in the sample) are characterized by relatively low rates of violent crime (40 per 100,000) and relatively high rates of property crime (6723 per 100,000).

For the 390 institutions in the sample, Charts 3 and 4 compare the campus crime rates with the crime rates in the cities and communities in which they are located. Chart 3 shows that students are 6 to 10 times safer from violent crime when they are on campus than when they are in the community. The shading on the bars shows that assault is the most frequent type of violent crime, both on campus and off. Two year institutions on average are housed in communities with the lowest rates of violent crime, and health sciences centers tend to be located in communities with the highest rates.

Chart 4 shows the corresponding comparison for property crime rates. The crime rates in their surrounding communities exceed those on campus for every type of institution, except for medical and health institutions, where the average of 10,744 per 100,000 exceeds even that of the

CHART THREE

On Campus versus Community Violent Crime Rate (Per 100,000) by Carnegie Type

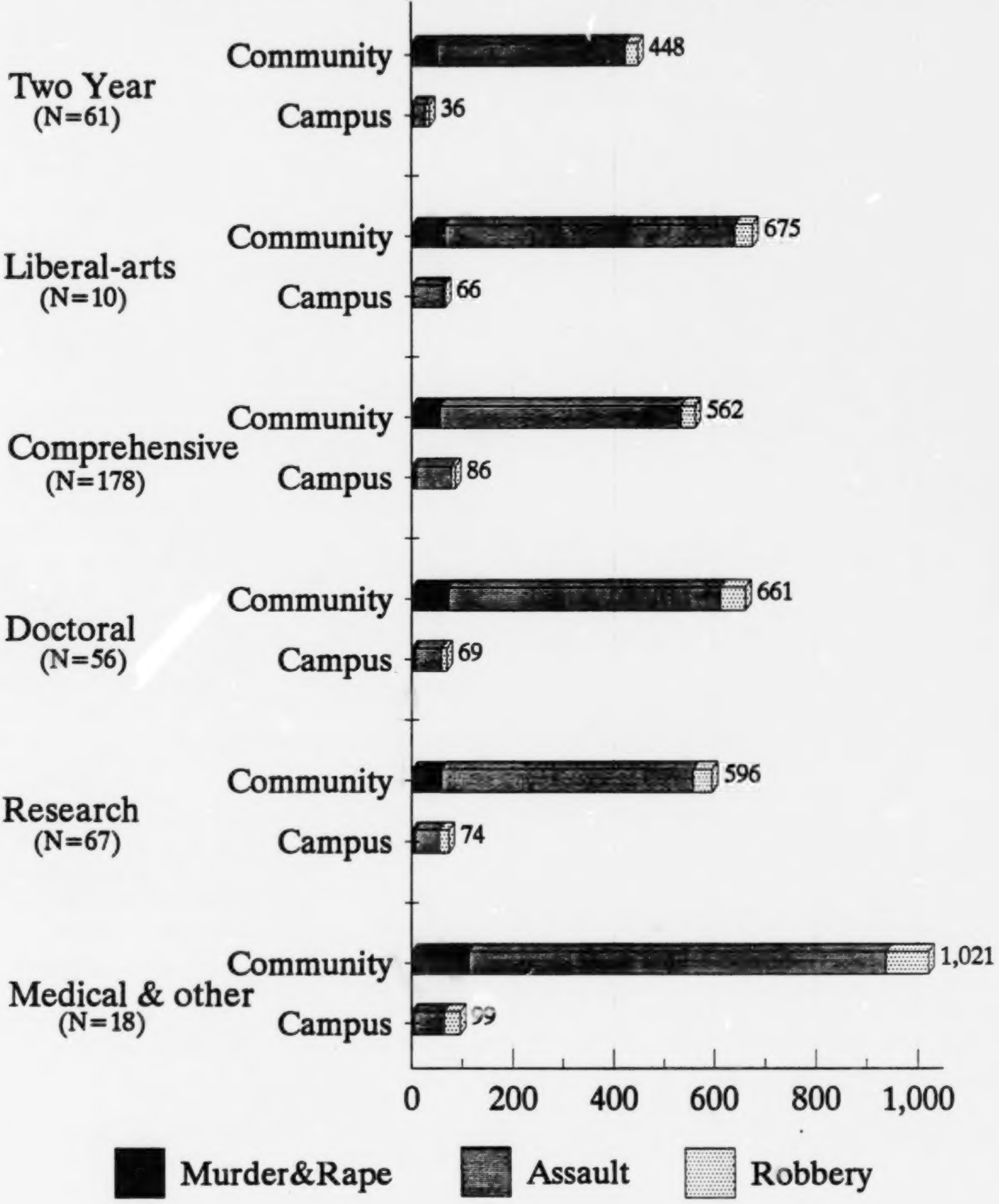
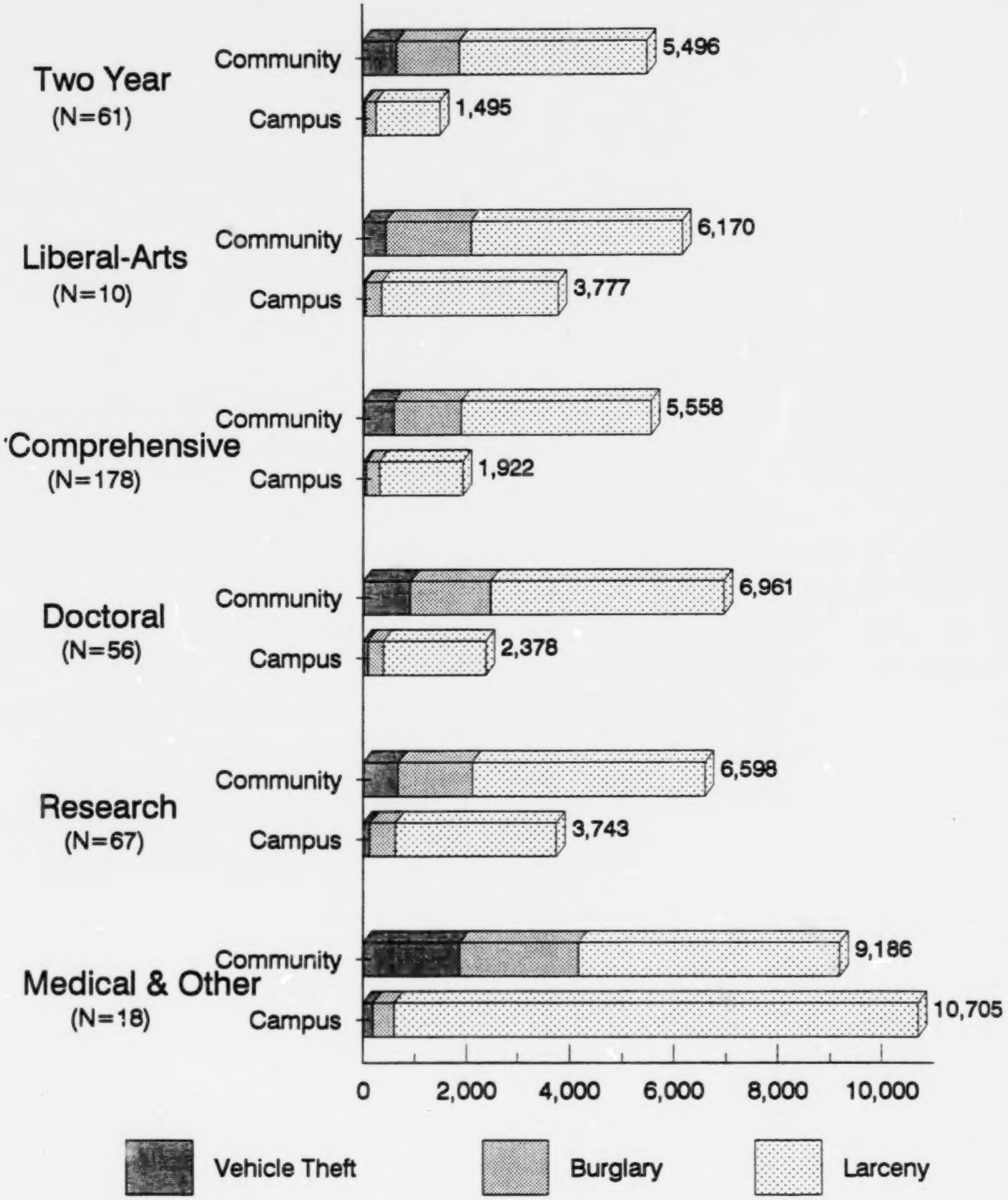


CHART FOUR

On Campus versus Community Property Crime Rate (per 100,000) by Carnegie Type



cities in which they are located. [A partial explanation for this finding may be the relatively small number and proportion of medical students at these institutions in comparison to the total number of employees and visitors. This translates a few crimes into a high rate.] Chart 4 also shows that, compared to larceny, the average rates of campus vehicle theft and burglary are small.

Correlates of Violent Crime

As noted above, we used the merged database and hierarchical regression to examine the relationships among crime rates and campus and student characteristics. Based upon prior theory and research, we added the community and structural variables to the regression first. In other words, we made the assumption that campuses are more likely to attract crime than to cause it, especially in view of the patterns in Charts 3 and 4. Likely offenders are generally present in greater numbers off-campus, than on-campus. We also assume that the community variables and the campus organizational characteristics are more enduring than individual students and their aggregate characteristics. Next we added the set of student characteristics into the hierarchical regression to examine their unique contribution to the explained variance. Lastly, we added campus police per capita on the assumption that police staffing is a response to crime and not a cause of it.

Table 5 shows the regression results for violent crime (mostly assault) in the first column, for property crime (mostly larceny) in the second column, and for the total crime rate in the third column.

The first column in Table 5 shows that our community variables by themselves explain an insignificant 3% of the variance in violent crime. Even the level of violent crime off-campus bears little relationship to violent crime on-campus. The campus organizational measures account for another 5% of the variance, also not significant. However, the student variables account for a highly significant 27%. Apparently, violent crime is more strongly associated with the nature of the students, than with the nature of the campus and the community within which it is located.

The fourth step in the hierarchical regression in Table 5 adds the level of campus police on the grounds that this is most probably an institutional response to crime. This single variable, though is not significant and adds only another 6% to the explained variance in violent crime.

The beta weights in the first column show the results of the final regression with all variables in the equation controlling for all others. Beta weights are standardized coefficients -- the larger the beta, the more influential the variable. The results in Table 5 indicate that campuses with the highest rates of violent crime tend to be those with higher than average percentages of minority students, campus police, male students, with lower than average cost and selectivity and fraternity life, and located in areas with lower than average population and poverty. Acting together, these measures explain 41% of the variance.

TABLE 5
RESULTS OF HIERARCHICAL REGRESSION
(Significant Beta Weights Only)

	Type of Campus Crime (Dependent Variable)					
	VIOLENT		PROPERTY		TOTAL	
INDEPENDENT VARIABLES	R^2	Beta	R^2	Beta	R^2	Beta
COMMUNITY CHARACTERISTICS						
Population		- .31**		- .16**		.18**
Urban/Non-Urban						
Poverty Percent		- .16		.08		
Average Temperature				-.19**		.17**
Community Violent Crime				.12		.13
Community Property Crime						
Community Police Ratio						
R^2 Increase	.03(ns)		.06(ns)		.05(ns)	
CAMPUS CHARACTERISTICS						
Total Enrollment						
Number of Full-time Faculty						
Tuition Cost						
Room and Board Cost		- .34**				
Number of Campus Acres						
Students Per Campus Acre				-.10		.10
Library Holdings per Student		.17				
R^2 Increase	.05(ns)		.19**		.19**	
STUDENT CHARACTERISTICS						
Percent from Top 10% of High School		- .22**		.62**		.59**
Percent in-State				.25**		.23**
Percent Male		.19				
Percent in Residence Halls				- .11		
Percent Minority		.57**		- .09		
Percent on Financial Aid				.14*		.12*
Percent Fraternity/Sorority		- .40**				
R^2 Increase	.27**		.39**		.36**	
CAMPUS POLICE		.40**		.81**		.83**
R^2 Increase	.06**		.21**		.23**	
TOTAL R^2	41**		.85**		.83**	

Note: All beta weights significant at .05 level (ns = non-significant beta weights)
* significant at .01
**significant at .001

Correlates of Property Crime

The second column in Table 5 shows that our community variables alone explain an insignificant 6% of the variance in property crime. Even the level of property crime off-campus bears little statistical relationship to property crime on-campus. On the other hand, the campus organizational characteristics account for an additional 19% of the variance in this crime rate, and the student variables account for another 39%. Property crime is strongly associated with the nature of the campus and its students.

However, we also find evidence of indirect, rather than direct effects between property crime and the nature of the city within which campuses are located. The hierarchical regression results after the third step show, not only that the measures of campus selectivity, cost, and resources are significantly associated with property crime, but also that population and poverty variables are significant. This finding is roughly consistent also with the results of our stepwise regression (not shown here) in which we found that student selectivity, percent in fraternities/sororities, percent female, and the population and poverty levels in host cities interacted to account for almost half the variance in campus property crime. It appears that relatively affluent and selective campuses are more likely to experience property crime, and even more likely still when located in cities with high rates of poverty and violent crime.

The fourth step in the hierarchical regression in Table 5 adds the level of campus police and explains another 21% of the variance in property crime. The raw correlation between campus property crime and campus police per capita is .76, making the rate of police staffing the best single predictor of property crime on campus.

The beta weights in the property crime column of Table 5 show the results of the final regression with all variables in the equation controlling for all others. The most influential variables associated with campus property crime are campus police per capita, rank in high school class, percent on financial aid, and percent in-state. The student density per acre, percent minority and the percent in residence halls are negatively related to property crime.

The presence of interaction effects is suggested by the fact that four community variables are significant in the final equation, even though they failed to prove influential in the first step of the hierarchical regression. Average temperature and being located in a heavily populated area are negatively related to property crime, while violent crime rates and percent below the poverty level is positively related to property crime. When these 10 variables with significant betas interact together, they explain 85% of the variance in campus property crime.

Correlates of Total Crime

The regression on total campus crime produced results similar to the regression for property crime. This was expected because the campus property crime rate in 1990 was 36 times greater than the campus violent crime rate across the entire sample. The last column in Table 5 displays an R-square pattern consistent with the second column: namely, a lack of significance after the first group of community variables are entered, an R-square increase of .19 after the campus measures are entered, and an increase of .36 at the third stage when the student characteristics are entered. As was true with property crime, there is a very high zero-order correlation between the total campus crime rate and campus police per capita (r = .75).

Before the campus police variable is entered, the third stage of the regression displays a large number of significant relationships between total crime and a combination of student characteristics (especially student selectivity), and of community traits (especially population and temperature). Having a high percent of students on financial aid and a low density of students per campus acre, also are related to this crime rate. Again we conclude that these variables interact with each other to provide the environment within which campus crime occurs.

Looking across the three columns of Table 5, there are only three variables that display significant beta weights in all three regressions. The area population is consistently negatively related to crime. This finding is not congruent with expectations. High student selectivity in terms of rank in class is associated with low rates of violent crime but with high rates of property and total crime. Other studies suggest that this measure may also be a proxy for student affluence. Finally, campus police presence is the strongest indicator of the presence of reported crime.

We were interested in the possibility of interaction effects, especially in view of the property crime regression results. The community characteristics, in particular, seem to be important only in combination with certain student characteristics. To test this hypothesis decided to conduct a hierarchical regression analysis entering the campus variables first and the community variables afterwards. Table 6 shows the R-square comparisons between the two procedures (community measures first versus student characteristics first). In the two cases, the results are not dramatically different, but the R-square change for the community variables with property crime does rise from .06 to .11 under the two different procedures. This tends to confirm the presence of significant interaction effects.

Table 6

Hierarchical Regression Results for Campus Crime
Changes in R^2 Values

Sources of Variance in Crime:	Violent	Property
With Community Variables First:		
Community Variables	.03	.06
Campus Organizational Measures	.05	.19*
Student Characteristics	.27*	.49*
Campus Police	.06	.11*
Total R^2	.41*	.85*
With Student Characteristics First:		
Student Characteristics	.27*	.43*
Campus Organizational Measures	.04	.10
Community Variables	.04	.11*
Campus Police	.06	.21*
Total R^2	.41*	.85*

* = Significant R^2 change.

DISCUSSION AND CONCLUSION

The literature contains few studies on the topic of campus crime, despite its importance. This study utilizes three national databases, as well as data from other sources, to examine, first, the trends in campus crime, and second, the correlates with various community, organizational, and student measures. The study produced several intriguing findings.

First, despite the impressions one might receive from the media, campus crime rates are falling, and they are falling in all categories except vehicle theft which remains level. Moreover, no observers believe the decline in campus crime rates can be attributed to declines in the frequency of reporting criminal acts by campus victims and police. In fact, the current environment encourages the reporting of crime, especially crimes like rape and assault, to a far greater extent than a decade ago.

The data used for this study does not include all categories of crime, such as weapons possession, hate crime, and substance abuse. Beginning in 1993, official reporting requirements will be expanded to include these other categories and future researchers will be able to see if particular types of crime, not reported here, are more common on college campuses.

Second, campuses are much safer than the communities in which they are located. The cities and counties in which colleges are located generally experience twice the rate of property crime and ten times the rate of violent crime than the campuses themselves. In fact, we believe the contrast between campus and community crime rates in reality is even more extreme because our data overestimate campus crime by including only crime per 100,000 students, ignoring the presence of employees and visitors. On many campuses, faculty and staff add another 20% or 30% to the campus full-time population, and large sports events like football and basketball attract many thousands of visitors to events that are notoriously associated with criminal acts, according to many campus police officials. Basing crime rates on the number of students is statistically convenient, but future studies should attempt to calculate rates based upon more realistic campus population estimates.

Third, we find major differences in crime rates at different types of colleges and universities. Compared to students at two-year colleges, those in medical schools and health science centers are 3 times more likely to be victimized by violent crime, and 7 times more likely to experience property crime. However, some of these results derive from the small population at some institutions where a few crimes translate into a high rate per 100,000 students.

The Elements of Crime and Crime Spillover

Criminologists typically consider that three elements must be present in order for crimes to occur. First, there must be an offender who is sufficiently motivated, and perhaps skilled enough, to commit a crime. Second, there must be a target of the crime -- for example, an auto to steal, a person to assault, or a stereo to take. Third, the target of the crime must lack a sufficient guardian to deter the crime. This simple notion can go a long way in explaining crime on campus.

Given this model, campuses that have a high percentage of students living in dormitories should expect high rates of burglary and larceny. This is because students who live on campus bring lots of lightweight durable goods with them (computers, stereos, televisions, and the like). These possessions make great targets for theft and burglary. Furthermore, the wealthier the student, the better the merchandise they will bring to campus. So, campuses with high dormitory populations and wealthy students should have even higher burglary and larceny rates. To make matters worse, students tend to be young, trusting, and naive. They are lousy guardians of their belongings. Not only do young people make good victims, they are also at a prime age to be involved in criminal activity. Alternatively, schools with large numbers of commuters and low dormitory populations should experience more problems with auto theft. Simply put, they have a lot of automobiles sitting around waiting to be stolen.

However, it is not only the characteristics of the campus and the students that make crime possible. Offenders can spill over from the community to the campus. When asked why he robbed banks, Willie Sutton replied: "Because that's where the money is." Offenders typically seek the highest payoff from a crime for the lowest cost. Certain types of offenders from the community may see the campus as being a soft target relative to targets in the community. This should be particularly true of economically motivated crimes that require a modicum of criminal expertise. In other words, crimes like motor vehicle theft, burglary, and robbery on campus may draw offenders from the community. The type of crime perpetrated depends upon the exact combination of campus, student, and community characteristics.

It certainly appears from our data that different types of crime exhibit different dynamics and patterns of causality. Our combinations of community variables, organizational measures, and student characteristics are better at accounting for campus property crime than violent crime. While it is more difficult to identify the variables that are associated with violent crime, our findings regarding campus property crime are relatively consistent with Routine Activities Theory and the Willie Sutton remark. Before the heavily influential campus police variable was entered into the regression, our analysis showed that 64% of campus property crime was associated with selective and affluent campuses located in cities and counties with high rates of poverty.

Most of the property crime rate consists of larceny --an offense that does not usually require professional talent. The other components of armed robbery and auto theft, on the other hand, are most often conducted by professional offenders. College students themselves may carryout larceny, but they are unlikely to work their way through college by means of armed robbery and auto theft. This suggests a separate study aimed at specific types of campus crime because the dynamics are very different.

The evidence for spillover from community to campus in this study is statistically significant, but the evidence is not consistent. While we found evidence of a spillover effect for property crime, we did not for violent crime. We successfully accounted for 85% of the variance in campus property crime, but only 41% of the variance in campus violent crime. What we did find out about violent crime, unfortunately, is consistent with national trends. Violent crime, three-fourths of which is assault, is more prevalent at campuses with above average percentages of minority students, campus police, male students, and below average cost and quality. This is no doubt a source of concern for all in higher education.

Our study obtained some results that were unexpected. While national crime rates are associated with urbanness, campus crime is not necessarily. For example, campus density in students per acre is negatively associated with property and total crime. Apparently, the more students are spread out, the more hospitable are the circumstances for property crime to occur. Another finding that is inconsistent with national crime patterns is that average temperature is negatively related to property and total crime. Northern locales generally experience less crime, but northern campuses in our study experienced more property crime.

We are not sure how to interpret the high relationship between campus crime and campus police. The high presence of campus police on campuses where crime is occurring may be a sign that administrators are acting responsively, or it may mean that crimes are more often reported and officially recorded on such campuses. The reporting issue is of particular interest to institutional researchers because they are the data managers and questionnaire respondents on most campuses. Studies like ours are heavily dependent upon accurate reporting. To the extent that victims, campuses, and localities under report crime, it interferes with our ability to understand its causality and to develop appropriate policy responses.

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1993 NEAIR Conference Attendees

P = 1993 Conference Attendee

F = First-time Conference Attendee at the Lake George Conference

Allison Aldrich P
Dir Budgets/Plng/Ins
Clarkson University
Box 5557
Potsdam, NY 13699-5557
Phone: 315-268-6590
Fax: 315-268-2319
E-mail: ADMINI01@CLVM

Catherine Alvord P
Data Analyst
Cornell University
440 Day Hall
Ithaca, NY 14853-2801
Phone: 607-255-7546
Fax: 607-255-2990
E-mail: CATHY_ALVORD@QMRELAY.MAIL.CORNELL.EDU

Marlene Arno P
Dir IR
Erie Community College
6205 Main St
Williamsville, NY 14221-7095
Phone: 716-851-1431
Fax: 716-851-1429
E-mail:

Lynn Atkinson P
Assoc. for IR
SUNY Univ Ctr - Binghamton
Office of Inst. Rsch.
Adm. 308/Box 6000
Binghamton, NY 13902-6000
Phone: 607-777-2365
Fax:
E-mail: LATKINSO@BINGVACX

Samuel Barbett F
Math Statistician
NCES
555 New Jersey Ave NW
Washington, DC 20208
Phone: 202-219-1592
Fax: 202-219-1679
E-mail:

Heather Barnes-Franklin F
Research Assistant
Keene State College
229 Main St
Keene, NH 03431
Phone: 603-358-2125
Fax: 603-358-5833
E-mail: HBARNES@PISGAH.KEENE.EDU

Karen Bauer P
Sr. Research Analyst
University of Delaware
334 Hullihen Hall
Newark, DE 19716
Phone: 302-831-2021
Fax: 302-831-8530
E-mail: KAREN.BAUER@MVS.UDEL.EDU

Bayard Baylis P
Associate Dean
Messiah College
Grantham, PA 17027
Phone: 717-766-2511 X6750
Fax: 717-691-6002
E-mail: BAYLIS@MCIS.MESSIAH.EDU

Craig S. Billie P
Assoc. for IR
SUNY Central Admin.
State University Plaza
Albany, NY 12246
Phone: 518-443-5639
Fax: 518-443-5677
E-mail: BILLIECS@SNYCENVM.BITNET

Peter Blanchfield F
Asst Dir IR
Hamilton College
198 College Hill Rd
Clinton, NY 13323
Phone: 315-859-4045
Fax: 315-859-4185
E-mail: PBLANCHF@ITSMAIL1.HAMILTON.EDU

Marilyn H. Blaustein P
Dir UMASS-Amherst
Institutional Res & Plng
237 Whitmore Adm Bldg
Amherst, MA 01003
Phone: 413-545-0941
Fax: 413-545-3010
E-mail: BLAUSTEIN@OIRP.UMASS.EDU

Phillip D. Boeding P
Registrar
US Coast Guard Academy
Registrars Office
15 Mohegan Ave
New London, CT 06320-4195
Phone: 203-444-8214
Fax: 203-444-8288
E-mail: PHILLIP_BOEDING@UNIXLINK.USCGA.EDU

Lawrence E. Braziel P
Dir MIS/IR
University of Southern Maine
96 Falmouth Street
Portland, ME 04103
Phone: 207-780-4431
Fax: 207-780-4607
E-mail: LARRY@USM.MAINE.EDU

David Breen P
Dir IR & Plng
Merrimack College
315 Turnpike St
North Andover, MA 01845
Phone: 508-837-5223
Fax: 508-837-5222
E-mail:

Jennifer A. Brown P
Dir IR
Connecticut State University
PO Box 2008
New Britain, CT 06050
Phone: 203-827-7700
Fax: 203-827-7406
E-mail: BROWNJ@BOT.CTSTATEU.EDU

Darryl E. Bullock P
Dir Plng & IR
Mercy College
555 Broadway
Dobbs Ferry, NY 10522
Phone: 914-674-7378
Fax: 914-693-4133
E-mail:

Rebecca Burgess F
Dir Rsch/Instl Eff
Finger Lakes Comm College
4355 Lakeshore Dr
Canandaigua, NY 14424
Phone: 716-394-3500 X484
Fax:
E-mail:

John Casey P
Dir IR
Georgian Court College
900 Lakewood Ave
Lakewood, NJ 08701-2697
Phone: 908-364-2200
Fax: 908-367-3920
E-mail:

Craig A. Clagett P
Dir Inst Resrch/Analysis
Prince George's Comm College
301 Largo Road
K-231
Largo, MD 20772
Phone: 301-322-0723
Fax: 301-808-0960
E-mail:

Rebecca Clifford P
Dir Planning
Bentley College
175 Forest St
Waltham, MA 02154-4705
Phone: 617-891-3431
Fax: 617-891-2569
E-mail: RCLIFFORD@BENTLEY.EDU

Fredric L. Cohen P
Dir Enrlmt Rsch & Anal
New York University
25 West Fourth St
3rd Fl
New York, NY 10012-1119
Phone: 212-998-4415
Fax: 212-995-4095
E-mail: JAFLC@UCCVM.NYU.EDU

Charlotte Conway P
Asst to Pres/Instl Plng
Columbia Union College
7600 Flower Ave
Takoma Park, MD 20912
Phone: 301-891-4121
Fax: 301-891-4022
E-mail:

David J. Costello P
Dean Enrollment Plng
Newbury College
129 Fisher Ave
Brookline, MA 02146
Phone: 617-730-7074
Fax: 617-931-7618
E-mail:

John D. Cotnam P
Asst VP Research
Monroe Community College
1000 E Henrietta Rd
Rochester, NY 14623-5780
Phone: 716-292-3031
Fax: 716-292-3060
E-mail:

Mary Ann Coughlin P
Asst Prof
Springfield College
263 Alden St
Springfield, MA 01109
Phone: 413-748-3038
Fax:
E-mail:

Diane Cuneo P
Dir IR
Smith College
Office of Instl Res
Northampton, MA 01063
Phone: 413-585-3022
Fax: 413-585-2123
E-mail: DCUNEO@SMITH.SMITH.EDU

Stephen Cunningham P
IR Specialist
Pennsylvania College of Tech
One College Avenue
Williamsport, PA 17701
Phone: 717-326-3761
Fax: 717-327-4503
E-mail:

Ingrid R. Cyros P
Asst Dir IR
Northeastern University
360 Huntington Ave
Boston, MA 02115
Phone: 617-437-5100
Fax: 617-373-5106
E-mail: ICYROS@NUHUB

Lawrence A. Dean P
Asst Dean Rsch & Plng
Greenfield Community College
One College Dr
Greenfield, MA 01301
Phone: 413-774-3131
Fax: 413-773-5129
E-mail:

Anne Marie DeLaney P
Dir Program Research
Boston College
Campion Hall 336A
Chestnut Hill, MA 02167
Phone: 617-552-0682
Fax: 617-552-4819
E-mail:

Gordon DeVries F
Research Associate
SUNY-Plattsburgh
Office of Analysis & Assmt
Kehoe 710
Plattsburgh, NY 12901
Phone: 518-564-4107
Fax: 518-564-4602
E-mail: DEVRIEGG@SPLAVB.BITNET

Kai Dhaliwal F
Research & Acct Analyst
Colgate University
13 Oak Drive
308 JB Colgate Hall
Hamilton, NY 13346
Phone: 315-824-7455
Fax: 315-824-7798
E-mail: KDHALIWAL@CENTER.COLGATE.EDU

Robyn Dickinson-Kiefer P
IR & Planning Officer
Lehigh Co Comm Coll
4525 Education Park Dr
Schnecksville, PA 18078
Phone: 215-799-1592
Fax: 215-799-2881
E-mail:

Dr. Gary L. Donhardt F
Director IR & Info Rscrs
Frostburg State University
College Avenue
Frostburg, MD 21532
Phone: 301-689-4187
Fax: 301-689-4737
E-mail:

John Driscoll F
Research Analyst
Boston University
881 Commonwealth Ave
2nd Fl Rm 232
Boston, MA 02215
Phone: 617-353-4135
Fax:
E-mail:

Anita Dubey P
17 Ashwood Ave
Wilmington, MA 01887
Phone: 508-658-2411
Fax:
E-mail:

Mark A. Eckstein P
Dir Assess & IR
Genessee Comm College
One College Road
Batavia, NY 14020
Phone: 716-343-0055 X445
Fax: 716-343-0055 X203
E-mail: MARKOBEAR@AOL.COM

Mary Edinburgh P
Dir IR
Empire State College
Two Union Avenue
Saratoga Springs, NY 12866
Phone: 518-587-2100
Fax: 518-587-5404
E-mail:

Amy Ensminger P
Coordinator IR
Mansfield University
128 Alumni Hall
Mansfield, PA 16933
Phone: 717-662-4856
Fax: 717-662-4995
E-mail: MCAAMY@VMHOST1.MNSFLD.EDU

Barbara Erdsneker P
Senior Research Assoc.
Bergen Community College
400 Paramus Road
Paramus, NJ 07652
Phone: 201-447-9207
Fax: 201-444-9042
E-mail: ERDSNEK@PILOT.NJIN.NET

James C. Fergerson P
Dir IR
Bates College
Lewiston, ME 04240
Phone: 207-786-8210
Fax:
E-mail: JFERGERS@ABACUS.BATES.EDU

Elaine J. Fetcie P
Asst to Dir Budgets
Clarkson University
Room 159
Snell Hall
Potsdam, NY 13699-5557
Phone: 315-268-6590
Fax: 315-268-2319
E-mail: ADMINI04@DARIUS.CLARKSON.EDU

Laura Filipp P
Coord Enrlmt Rsch
Johns Hopkins University
108 Merryman Hall
3400 N. Charles St
Baltimore, MD 21218-2687
Phone: 410-516-5121
Fax: 410-516-6025
E-mail: FILIPP@JHUVM

Phyllis A. Fitzpatrick P
Dir. Management Info.
Fairfield University
North Benson Rd
Fairfield, CT 06430-7524
Phone: 203-254-4000 x2774
Fax: 203-254-4060
E-mail: PFITZPATRICK@FAIR1.FAIRFIELD.EDU

Thomas Flaherty P
Dir Planning & IR
Central CT State Univ
1615 Stanley Street
New Britain, CT 06050
Phone: 203-827-7305
Fax: 203-827-7200
E-mail: FLAHERTY@CCSU.CTSTATEU.EDU

George T Force P
Dir Ac Plng/Eval
Slippery Rock University
308 Old Main
Slippery Rock, PA 16057
Phone: 412-738-2001
Fax: 412-738-2918
E-mail:

Eleanor Fujita P
Dir IR
Hudson County Comm College
155 Calhoun Ave
New Rochelle, NY 10801
Phone: 201-714-2190
Fax: 201-656-9278
E-mail:

Michael A. Fusco F
Director of Mktg
Bentley College
175 Forest St
Rauch 310
Waltham, MA 02154-4705
Phone: 617-891-2399
Fax: 617-891-3414
E-mail: ADMRSRCH@BENTLEY

LiAnne C. Gabe P
Dir Inst Studies
Stockton College of NJ
Jimmie Leeds Rd
Rm D-116
Pomona, NJ 08057
Phone: 609-652-4729
Fax: 609-652-4958
E-mail: IAPROD134@VAX003@STOCKTON.EDU

Kathleen Gemmell P
Dir. Plan/Policy Anal.
Cornell University
College of Arts and Sciences
201 Lincoln Hall
Ithaca, NY 14853-4701
Phone: 607-255-7335
Fax: 607-255-8463
E-mail: KSG3@CORNELL.EDU

Indira Govindan P
Dir Drew University
University Research Ctr
36 Maidson Ave
Madison, NJ 07940-4169
Phone: 201-408-3636
Fax: 201-408-3080
E-mail: IGOVINDA@DREW.EDU

Martha Gray P
Asst. Dir IR & Enrlm Plng
Ithaca College
3 Job Hall
953 Danby Rd
Ithaca, NY 14850
Phone: 607-274-3164
Fax: 607-274-1500
E-mail: GRAY@ITHACAOA.BITNET

Richard C. Heck P
Instl Plan. & Researcher
Colgate University
13 Oak Drive
308 J B Colgate Hall
Hamilton, NY 13346
Phone: 315-824-7455
Fax: 315-824-7798
E-mail: RHECK@CENTER.COLGATE.EDU

David Hemenway P
Dir Plng & IR
Eastern CT State Univ
83 Windham St
Willimantic, CT 06226
Phone: 203-456-5306
Fax: 203-456-5650
E-mail: HEMENWAYD@ECSGC.CTSATE.EDU

Ann Henderson P
Registrar & Dir IR
Skidmore College
815 North Broadway
Saratoga Springs, NY 12866
Phone: 518-584-5000 X2210
Fax: 518-584-7963
E-mail: AHENDERS@SKIDMORE.EDU

Marie Huester F
Asst. Dir IR
Marywood College
2300 Adams Ave
Scranton, PA 18509-1598
Phone: 717-348-6203
Fax: 717-348-1899
E-mail:

Sherrill L. Ison P
Mgr. Research Services
Monroe Community College
1000 E. Henrietta Rd.
Rochester, NY 14623
Phone: 716-272-3032
Fax: 716-272-9924
E-mail: SISON@ACADCOMP.ECKERT.MONROECC.EDU

Stanley S. Jacobs P
Project Mgr
Villanova University
HOS Institute
Villanova, PA 19085
Phone: 215-519-4559
Fax: 215-519-7162
E-mail:

John P. Jacobsen P
Data and Info. Manager
PA State System of Higher Ed.
PO Box 809
301 Market St
Harrisburg, PA 17108
Phone: 717-783-4640
Fax: 717-783-3362
E-mail: JJACOBSE@SSHE1.SSHECHAN.EDU

Marianne Jaffee F
Asst Dir IR
SUNY New Paltz
Manheim Blvd
New Paltz, NY 12401
Phone: 914-257-3227
Fax:
E-mail:

Robert Jalbert P
Director of Research
Norwalk Community-Tech Coll.
188 Richards Avenue
Norwalk, CT 06854
Phone: 203-857-7081
Fax: 203-857-7012
E-mail:

Margo Jenks F
Research Asst
Northeastern University
360 Huntingdon Ave
Boston, MA 02115
Phone: 617-373-5100
Fax: 617-373-5106
E-mail:

Thomas P. Judd P
Dir IR
Rockland Comm. College
145 College Road
Suffern, NY 10901
Phone: 914-574-4266
Fax: 904-357-1529
E-mail:

Ellen Armstrong Kanarek P
Program Dir/Applied
Educational Research Inc.
100 Thanet Circle
Princeton, NJ 08540
Phone: 609-924-0464
Fax: 609-924-2025
E-mail: KANAREK@PUCC.BITNET

Kathleen A. Keenan P
Dir IR
Massasoit Comm. College
One Massasoit Boulevard
Brockton, MA 02402
Phone: 508-588-9100 X197
Fax: 508-588-1522
E-mail:

Helen S. Kerr P
Dir IR
Washington College
300 Washington College
Chestertown, MD 21678
Phone: 410-778-7713
Fax: 410-778-7850
E-mail: HELEN_KERR@WASHCOLL.EDU

Jean Morlock Kibler P
Assoc for IR
SUNY--Plattsburgh
Office of Analysis & Assess
Plattsburgh, NY 12901
Phone: 518-564-4106
Fax: 518-564-2094
E-mail: KIBLERJV@SNYPLAVB.BITNET

Dr. Yun K. Kim P
Dir IR
Goucher College
1021 Dulaney Valley Rd
Baltimore, MD 21204
Phone: 410-337-6145
Fax: 410-337-6123
E-mail: YKIM@UMAB

Richard L. Kline P
Dir IR
California Univ of PA
250 University Ave
California, PA 15419-1394
Phone: 412-938-4265
Fax: 412-938-5832
E-mail: KLINE@CUP.EDU

Roslyn Korb P
Sr Statistician
NCES
555 New Jersey Ave NW
Washington, DC 20208-5652
Phone: 202-219-1587
Fax: 202-219-1751
E-mail:

Denise A. Krallman P
Instl Rsch Analyst
Miami University
Budgeting/Planning/Analysis
205 Roudebush Hall
Oxford, OH 45056
Phone: 513-529-7095
Fax: 513-529-2121
E-mail: KRALLMAN@MIAMIU.ACS.MUOHIO.EDU

Arthur Kramer P
Dir IR
Passaic County Comm Coll
1 College Boulevard
Paterson, NJ 07509-1179
Phone: 201-684-6741
Fax: 201-684-5843
E-mail:

John Kraus P
Dir IR
Univ. of New Hampshire
Palmer House
20 Rosemary Lane
Durham, NH 03824
Phone: 603-862-2410
Fax: 603-862-3853
E-mail: 'UNHN::J_KRAUS'@UNHH.UNH.EDU

William LeBlanc P
Dir IR & Planning
Comm. College of RI
400 East Avenue
Warwick, RI 02886-1805
Phone: 401-825-2225
Fax: 401-825-2418
E-mail:

Marcia M. Lee P
Dir IR
Westchester Community College
75 Grasslands Road
Valhalla, NY 10595
Phone: 914-285-6589
Fax: 914-285-6565
E-mail:

Linda LeFauve P
Coor Admissions Rsrch
SUNY-Buffalo
406 Capen Hall
Buffalo, NY 14260
Phone: 716-636-2791
Fax: 716-645-3799
E-mail: LEFAUVE.OFFSYS@OSMAIL.BUFFALO.EDU

Albert C. Lefebvre P
Dir IR & Stu Records
Clark University
950 Main Street
Worcester, MA 01610-1477
Phone: 508-793-7546
Fax: 508-793-7500
E-mail: ALEFEBVRE@VAX.CLARKU.EDU

Deborah Lessne P
Research Analyst
Community-Technical Colleges
61 Woodland Street
Hartford, CT 06105
Phone: 203-725-6664
Fax: 203-566-6624
E-mail: LESSNE_D@COMMNET.EDU

Walter Liss P
Research Analyst
Tufts University
28 Sawyer Avenue
Medford, MA 02155
Phone: 617-627-3274
Fax: 617-627-3993
E-mail: WLISS@PEARL.TUFTS.EDU

Wendell G. Lorang P
Assoc. Dir. IR
SUNY-Albany
1400 Washington Avenue
Albany, NY 12222
Phone: 518-442-5410
Fax: 518-442-5418
E-mail: WGL.UACSC2.ALBANY.EDU

G. Gregory Lozier P
Exec. Dir. Plan/Analysis
Penn State University
405 Old Main
University Park, PA 16802
Phone: 814-863-0405
Fax: 814-863-7031
E-mail: GGL1@OAS.PSU.EDU

Cynthia Lucia F
Staff Assistant
Potsdam State College
Information Services
Potsdam, NY 13676
Phone: 315-267-2082
Fax: 315-267-2170
E-mail: LUCIACB@POTSDAM.EDU

James F. Macklin P
Dir IR
Hudson Valley Comm. College
80 Vandenburgh Avenue
Troy, NY 12180
Phone: 518-270-1577
Fax: 518-270-1547
E-mail:

Nancy B. Marino P
Dir IR
SUNY College of Techno
Alfred, NY 14802
Phone: 607-587-4796
Fax: 607-587-3294
E-mail: MARINONB@SALFVA.BITNET

Alan H. McArdle P
Instl Res Asst
UMASS-Amherst
237 Whitmore Bldg
Amherst, MA 01003
Phone: 413-545-5149
Fax: 413-545-3010
E-mail: AMCARDLE@OIRP.UMASS.EDU

Michael McGuire P
Dir IR
Franklin & Marshall College
P.O. Box 3003
Lancaster, PA 17604-3003
Phone: 717-291-3993
Fax: 717-291-4183
E-mail: M_MCGUIRE@ACAD.FANDM.EDU

Carrie Merrick F
Database Coordinator
Newbury College
129 Fisher Ave
Brookline, MA 02146
Phone: 617-730-7011
Fax: 617-731-9618
E-mail:

Larry W. Metzger P
Dir IR & Enr Plng
Ithaca College
953 Danby Rd
Ithaca, NY 14850
Phone: 607-274-3164
Fax: 607-274-1500
E-mail: METZGER@ITHACAOA.BITNET

Michael Middaugh P
Dir IR & Planning
University of Delaware
334 Hullihen Hall
Newark, DE 19716
Phone: 302-831-2021
Fax: 302-831-8530
E-mail: Michael.Middaugh@MVS.UDEL.EDU

Mark L. Molnar F
Sr. Programmer/Analyst
SUNY-Buffalo
406 Capen
North Campus
Buffalo, NY 14260
Phone: 716-645-2791
Fax: 716-645-3799
E-mail: ISTMLM@UBVM.BITNET

Robert Morse P
Senior Editor
US News & World Report
2400 N Street NW
Room 216
Washington, DC 20037-1196
Phone: 202-955-2389
Fax: 202-955-2049
E-mail:

Peter J. Murray P
Dir Planning & IR
Catholic Univ of America
620 Michigan Ave
Washington, DC 20064
Phone: 202-319-5212
Fax: 202-319-5214
E-mail: MURRAYP@CUA.EDU

Richard M. Myhalyk P
Asst. to the Pres. IR&P
St. Michael's College
Box 40
Winooski Park
Colchester, VT 05439-0040
Phone: 802-654-2215
Fax: 802-655-4079
E-mail: MYHALYK@SMCVAX

Anthony Napoli F
Dir IR
Suffolk Community College
533 College Rd
South Building
Selden, NY 11784
Phone: 516-451-4842
Fax: 516-451-4216
E-mail:

Saguna Nayak P
Director
Admin Computing/Registrar
University of Pitt-Bradford
300 Campus Drive
Bradford, PA 16701-2898
Phone: 814-362-7600
Fax:
E-mail: SNNI@VMS.CIS.PITT.EDU

Randy Nehila P
Special Studies Analyst
Boston University
881 Commonwealth Ave.
2nd Fl/Rm 232
Boston, MA 02215
Phone: 617-353-4113
Fax:
E-mail: ERL8HRN@BUACCA.BITNET

Marian F. Pagano P
Dir Planning & IR
Columbia University
211 Low Library
New York, NY 10027
Phone: 212-854-2473
Fax: 212-932-0418
E-mail: INRMP@CUVMC.BITNET

Caroline L. Pike P
Research Analyst
Ithaca College
3 Job Hall
Ithaca, NY 14850
Phone: 607-274-3164
Fax: 607-274-1500
E-mail: CPIKE@ITHACAOA.BITNET

Elizabeth Plotzker P
Dir Instl Plng/Rsch
Siena College
515 Loudon Road
Loudonville, NY 12211-1462
Phone: 518-783-2380
Fax: 518-783-4293
E-mail: PLOTZKER@SIENA.BITNET

Sandra J. Price P
Dir IR
Keene State College
229 Main Street
Keene, NH 03435-1505
Phone: 603-358-2117
Fax: 603-357-5833
E-mail: SPRICE@PISGAH.KEENE.EDU

Richard W. Prull P
Dir IR
Rhode Island College
600 Mt. Pleasant Avenue
Providence, RI 02908
Phone: 401-456-8435
Fax: 401-456-8287
E-mail:

H. Caryl Purdue P
Assoc Dean Plan & Dev
Schenectady County Comm. Coll.
78 Washington Ave
Schenectady, NY 12302
Phone: 518-346-6211
Fax: 518-346-8680
E-mail:

Joseph Revelt P
Descriptive Statistician
Shippensburg University
1871 Old Main Dr
Shippensburg, PA 17257
Phone: 717-532-1154
Fax: 717-532-1273
E-mail: JEREVE@ARK.SHIP.EDU

Stuart L. Rich P
Dir IR
Georgetown University
Room 303 Maguire Hall
37th & O St NW
Washington, DC 20057-1099
Phone: 202-687-3424
Fax: 202-687-3935
E-mail: RICH@GUVM.BITNET

James L. Ritchie P
Asst Dir IR
University of Pittsburgh
1904 Cathedral of Learning
Pittsburgh, PA 15260
Phone: 412-624-1220
Fax: 412-624-1817
E-mail: JLR@VMS.CIS.PITT.EDU

Richard Rugen P
Asst to Pres of Planning
Kutztown University
Kutztown, PA 19530
Phone: 215-683-4153
Fax: 215-683-4010
E-mail: RUGEN@ACAD.CSV.KUTZTOWN.EDU

Barbara R. Sadowski P
Dir Academic Comp
Marywood College
2300 Adams Ave
Scranton, PA 18509
Phone: 717-348-6215
Fax: 717-348-1817
E-mail: BRS@MARYWOOD1.MARYWOOD.EDU

Gregory J. Sanders F
Researcher
Ithaca College
953 Danby Rd
Ithaca, NY 14850
Phone: 607-274-3164
Fax: 607-274-1500
E-mail: GSANDERS@ITHACAOA.BITNET

M. Therese Scanlon F
Registrar
Phila College Pharmacy Science
600 South 43rd St
Philadelphia, PA 19104-4495
Phone: 215-596-8816
Fax: 215-895-1100
E-mail: SCANLON@HSLC.ORG.BITNET

Scott Schnackenberg P
Dir Instl St
Columbia Univ
Box 151
525 W 120th St
New York, NY 10027
Phone: 212-678-3706
Fax: 212-678-4048
E-mail: SCHNACK@CUTCSQ.TC.COLUMBIA.EDU

Charles Secolsky P
Associate for IR
Rockland Community College
145 College Rd
Suffern, NY 10901
Phone: 914-574-4266
Fax: 914-357-1529
E-mail:

David G. Seguin P
Asoc Dean IR
Jamestown Community College
525 Falconer St
Jamestown, NY 14701
Phone: 716-665-5220 X319
Fax: 716-665-9110
E-mail: SEGUINDG@SUNYJCC.BITNET

Sr. Mary George Senderak P
Dir IR
College of Saint Elizabeth
2 Convent Road
Morristown, NJ 07960-6989
Phone: 201-292-6307
Fax: 201-292-6777
E-mail:

Daniel B. Shapiro P
Dir IR
University of Pennsylvania
4200 Pine St-5A
Philadelphia, PA 19104-4090
Phone: 215-898-5897
Fax: 215-898-9876
E-mail: SHAPIRO@UNDERGROUND.RHE.UPENN.EDU

Robert J. Simins F
Instl Rsch Assoc
SUNY-Farmingdale
Melville Rd & Route 110
Farmingdale, NY 11735
Phone: 516-420-2403
Fax: 516-420-2693
E-mail: SIMINSRJ@SNYFARVA.BITNET

Gerald Sircus F
Dir IR
Bergen Comm. College
400 Paramus Road
Paramus, NJ 07652
Phone: 201-447-7119
Fax:
E-mail:

Leah J. Smith P
Asst to Pres/Dir IR
Swarthmore College
500 College Avenue
Swarthmore, PA 19081-1397
Phone: 215-328-8327
Fax: 215-328-8673
E-mail: LSMITH1@CC.SWARTHMORE.EDU

Carol Snack P
Instl Rsch Coord
Caldwell College
9 Ryerson Ave
Caldwell, NJ 07006-6195
Phone: 201-228-4484 X228
Fax:
E-mail:

James A. Stager P
Assoc VP - Acad Affairs
Millersvile University
Biemesderfer Executive Center
Millersville, PA 17551
Phone: 717-872-3599
Fax: 717-872-2251
E-mail: JSTAGER@MU3.MILLERS.EDU

Ann Marie Stamford F
Research Assistant
Univ of Scranton
Office of Assess & IR
AMH 119
Scranton, PA 18510-4629
Phone: 717-941-6344
Fax: 717-941-7899
E-mail: STAMFORDA1@LION.UOFS.EDU

Sandra Starke F
Dir Budget/IR
SUNY-Binghamton
P O Box 6000
Binghamton, NY 13902
Phone: 607-777-2365
Fax:
E-mail:

William Strausbaugh P
Exec. Asst to President
Messiah College
Grantham, PA 17027
Phone: 717-766-2511 X2030
Fax: 717-691-6025
E-mail:

Alan J. Sturtz P
Dir IR
Gateway Comm-Tech College
60 Sargent Drive
New Haven, CT 06511
Phone: 203-789-7030
Fax: 203-789-6466
E-mail: STURTZ@APOLLO.COMMNET.EDU

Eleanor Swanson P
Dir Self-Study Rsch
College of New Rochelle
29 Castle Pl Rm 209
New Rochelle, NY 10805-2308
Phone: 914-654-5209
Fax: 914-654-5554
E-mail:

Bruce Szelest P
Assoc for IR
SUNY-Albany
Administration 241
1400 Washington Ave
Albany, NY 12222
Phone: 518-442-5410
Fax:
E-mail: BPS23@ALBNYVM1

Suzanne Szydlik P
Dir IR
Mass Bay Comm College
50 Oakland St
Wellesley Hills, MA 02181
Phone: 617-237-1100 X169
Fax: 617-239-3605
E-mail:

Deborah J. Teeter P
Dir IR & Planning
University of Kansas
PO Box 505
Lawrence, KS 66044-0505
Phone: 913-864-4412
Fax: 913-864-5324
E-mail: IRDJT@UKANVM.CC.UKANS.EDU

Dawn Geronimo Terkla P
Dir IR
Tufts University
28 Sawyer Avenue
Medford, MA 02155
Phone: 617-627-3274
Fax: 617-627-3933
E-mail: DTERKLA@PEARL.TUFTS.EDU

Barbara Thelen P
Asst for IR
Rockland Comm. College
145 College Rd
Suffern, NY 10901
Phone: 914-574-3166
Fax: 914-356-1529
E-mail:

James F. Trainer P
Dir HEDS
Franklin & Marshall College
P O Box 3003
Lancaster, PA 17604-3003
Phone: 717-399-4448
Fax: 717-399-4456
E-mail: HEDS@ACAD.FANDM.EDU

Dale Trusheim P
Associate Dir IR
University of Delaware
325 Hullihen Hall
Newark, DE 19716
Phone: 302-831-2021
Fax: 302-831-8530
E-mail: ACA12642@UDELVM.EDU

J. Fredericks Volkwein P
Dir IR
SUNY-Albany
Administration 241
1400 Washington Ave
Albany, NY 12222
Phone: 518-442-5410
Fax: 518-442-5418
E-mail: JFV65@ALBNYVM1

Richard A. Wagner P
Research Analyst
Smith College
College Hall 30
Northampton, MA 01063
Phone: 413-585-3024
Fax:
E-mail: RWAGNER@SMITH.SMITH.EDU

David Webb F
Assess Coord IR
Frostburg State Univ
College Ave
Frostburg, MD 21532
Phone: 301-689-4749
Fax: 301-689-7069
E-mail: D2IRWEB@FRA01.FSU.UMD.EDU

Jennifer Wilton P
Acting Dir IR
UMASS-Boston
100 Morrissey Blvd
Boston, MA 02125
Phone: 617-287-5420
Fax: 617-265-7173
E-mail: WILTON@UMBSKY.CC.EDU

Jane Winters F
Asst Dir IR
SUNY-New Paltz
Rt 32
New Paltz, NY 12561
Phone: 914-257-3227
Fax:
E-mail:

Marjorie E. Wiseman P
Dir IR
Northeastern University
401 Churchill Hall
Boston, MA 02215
Phone: 617-373-5100
Fax: 617-373-5106
E-mail: MWISEMAN@NUHUB

Martin Wisniewski P
Assoc DeanComp Serv
Cayuga Community College
197 Franklin St
Auburn, NY 13021
Phone: 315-255-1743 XT220
Fax: 315-255-2050
E-mail: WISNIEWSKI@CAYUGA.CAYUGA.CC.EDU

Carol W. Wood P
Asst to the Dean
Alfred University
2 Pine St
Alfred, NY 14802
Phone: 607-871-2243
Fax: 607-871-2161
E-mail: WOOD@BIGVAX.ALFRED.EDU

Jane Zeff P
Asst Dir Plng/Rsch/Eval
William Paterson College
300 Pompton Road
Wayne, NJ 07470
Phone: 201-595-3115
Fax: 201-595-2460
E-mail: ZEFF@PILOT.NJIN.NET

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